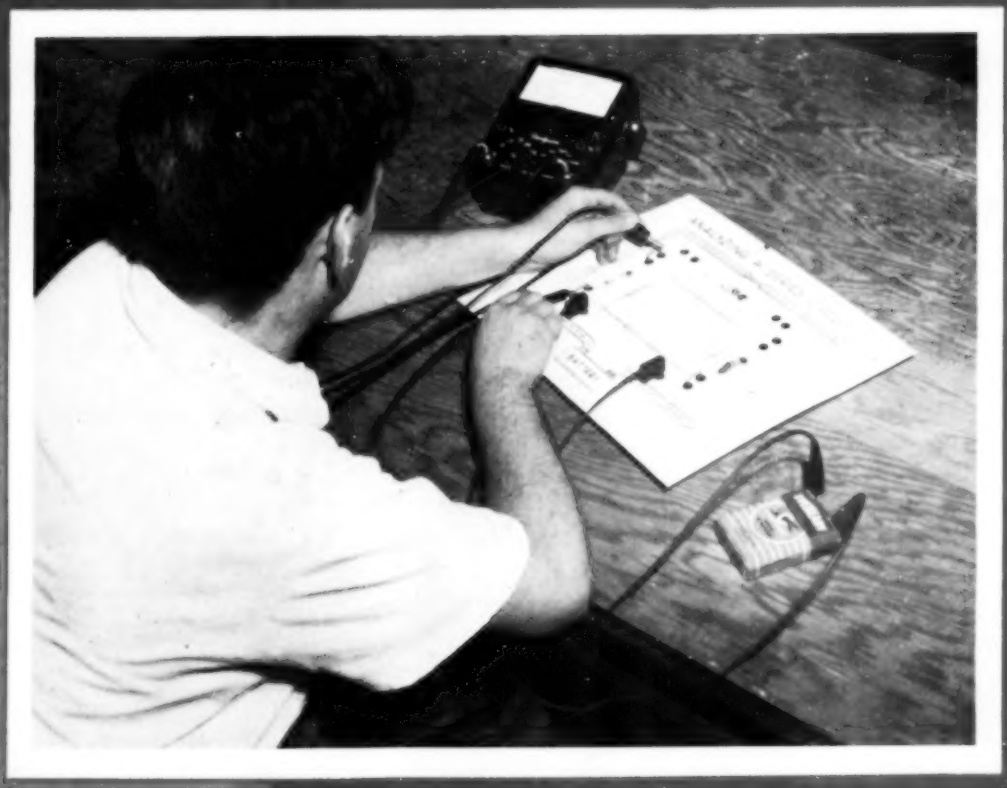
OCTOBER, 1955 Vol. 44, No. 8

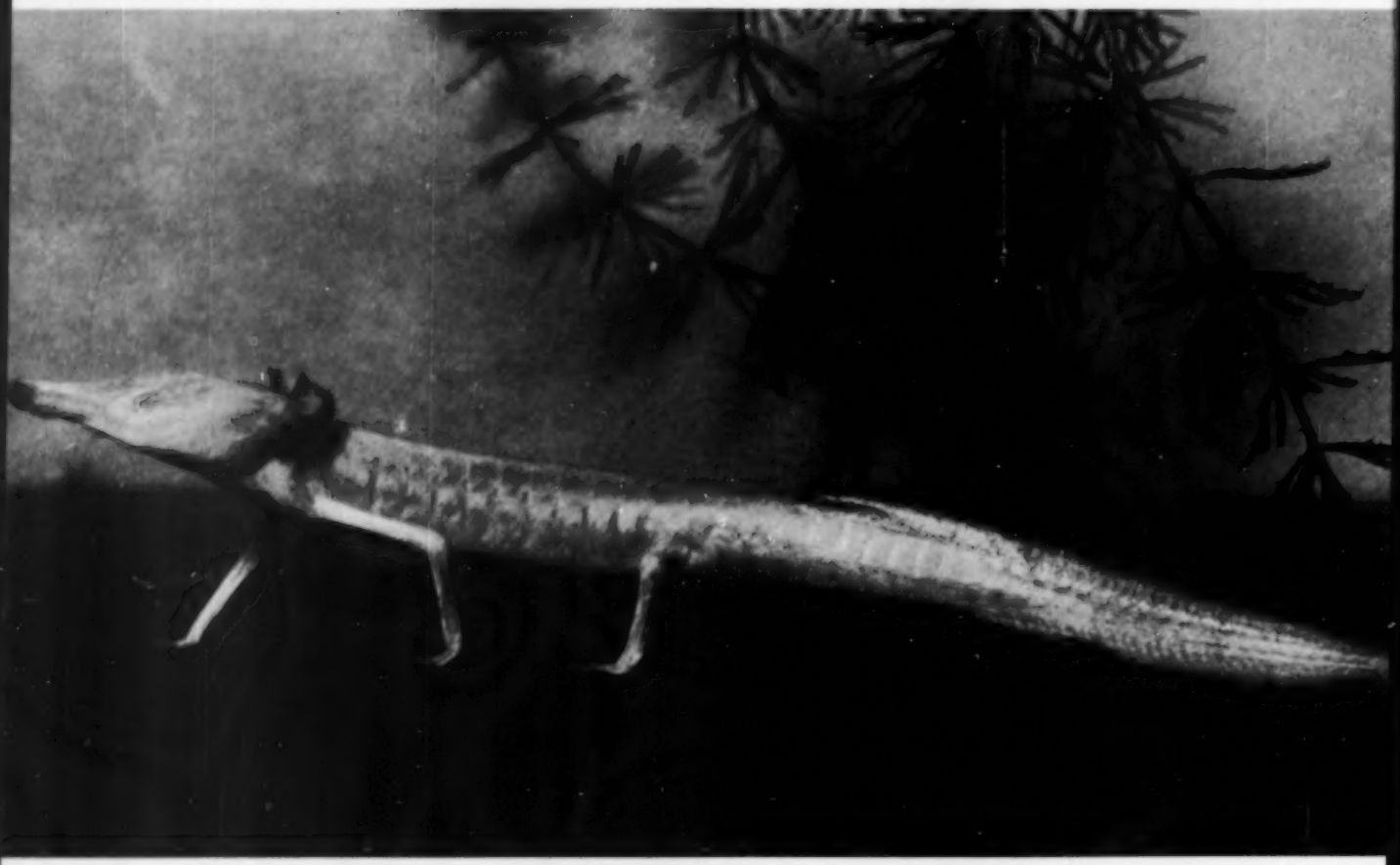
Industrial Arts and Vocational Education



The Shop Teachers' Professional Magazine

SHOP PROJECTS NUMBER

BECAUSE IT IS NOT REQUIRED



The responsiveness of living creatures to the demands laid upon them by environment is evidenced at every turn. The cave salamander has rudimentary optic nerves, but because the murky depths of its underground home do not require sight, it does not see. In the physical world this responsiveness is evidenced over an evolutionary cycle. But with the human psyche, the response is almost *immediate*.

In the case of a youngster, because the lines of communication between the adult world and himself may break down, demand may not be felt until the boy's habits and nature have "hardened" and it is too late. The wise educator knows this and he tries to reflect in the immediacy of his classroom the requirements of a world too far away for the youngster to comprehend.

Such an educator asks for good work, for conscientious work. He shows to his boys the vision of the possible and paints it in the colors of the desirable. He weaves a firm fabric of habit within the student and makes sure the fabric is never weakened by any inconsistency on his part. The instructor in mechanical drafting for example never breaks the consistency of *his* aims by encouraging or permitting the use of inferior, shoddy, cheaply made drawing instruments. *He* insists that the best alone is consistent with his teachings.

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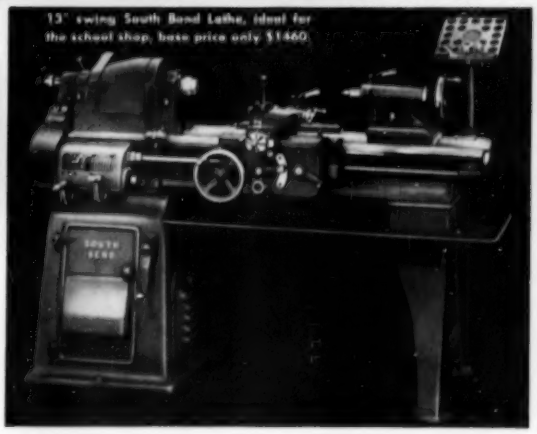
Why BETTER EQUIPPED SCHOOLS SPECIFY *South Bend Lathes*

Hower Vocational School, Akron, Ohio, equipped with 32 South Bend Lathes—A total of 77 South Bend Lathes now in use in Akron Schools.



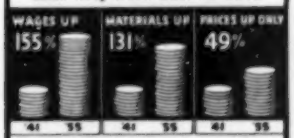
The almost universal use of South Bend Lathes in the better equipped schools and universities is the result of very careful selection by capable educators. And there are many good reasons behind their decisions.

Perhaps the most frequent reason is that South Bend Lathes prove to be the best value that can be found, especially for use in school shops. They are reasonable in price and their rugged construction assures long life, even with the unavoidable abuse of inexperienced operators. This makes budgets go farther.

Teaching Helps

Make your teaching easier and more effective by using South Bend handbooks on operation of lathes, drill presses and shapers; project book; wall charts; motion pictures and slides; scale models of machine tools. Write for complete information.

Compared with our costs
OUR PRICES ARE LOWER
than they were back in 1941



Prices are closely tied to costs. Costs are still rising. Buy now before increased costs necessitate higher prices.

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☐ 10" to 16-24" FLOOR LATHES

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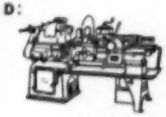

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Street_____ City & State_____

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Your new equipment requisitions should include a new

Toolmaster

What are your standards for vocational shop equipment? Whatever they are, you will find that the new CINCINNATI Toolmaster Milling Machines measure up to all your requirements. They are built to the highest industrial standards of quality and cutting capacity, yet they are priced within most school budgets. Toolmaster Milling Machines are safe and easy to operate and maintenance is next to zero. They are designed to meet tool and die shop demands for versatility, and for this very reason, your students will become familiar with a variety of milling setups.

You will be interested in these *quick facts:* turret mount for overarm swivels 180° . . . spindle head swivels 90° right and left . . . 8 spindle speeds (within three ranges, up to 5650 rpm for 1A and 1B machines) . . . manual feed . . . many attachments and accessories available, including Shaping Attachment.

Would you like more information? Write for new four-color catalog No. M-1870-2.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

NEW
CINCINNATI TOOLMASTER
MILLING MACHINE

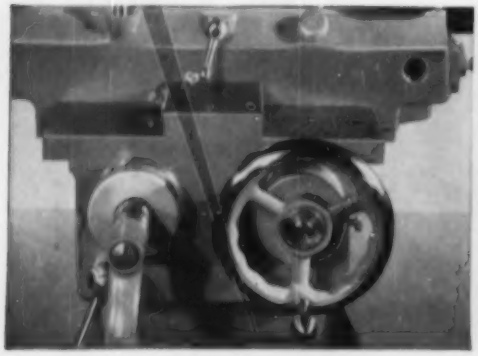
Built in three styles:

	Range:
1A—Manual feed to quill, 1 hp motor	16" table traverse
1B—Power feed to quill, 1 hp motor	10" cross
1C—Heavy duty head, 2 hp motor	17" vertical

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

Extra Wide Knee
Has two advantages: wide square gibbed bearing ways for maximum strength; narrow guide for smooth cross adjustment.



Shaping Attachment
The ruggedly constructed Shaping Attachment greatly increases the variety of work which can be handled on the Toolmaster Milling Machine.

Oil-Shot Lubrication
Saddle-table parts and way bearing surfaces are lubricated from centralized oil-shot system.

OCTOBER
1955

VOL. 44 NO. 8

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

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★ ★ ★ ★

This Month's Cover

In the photograph on the cover of this issue a student is shown analyzing a series circuit.

With this aid the student can visualize the three rules learned in radio physics which are:

1. The current is the same in a series circuit.
2. The total voltage drops are equal to the source voltage.
3. Total resistances are equal to the sum of the resistances of the individual resistors.

The aid has an inner circuit showing a schematic diagram of the series circuit; middle circuit has three resistors physically connected in series with a battery, and the outer circuit helps the student to see what is happening in a series circuit.

Instructor is Michael Fichera, electronics, radio, and television shop, and the photography is by Charles F. Green, school photographer, Middlesex County Vocational and Technical High School, New Brunswick, N. J.

★ ★ ★ ★

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Association News

ANNUAL WORKSHOP PROGRAM HELD

Edward G. Ludtke, program specialist in vocational trade and industrial education from the U. S. Office of Education in Washington, D. C., participated in the annual Workshop for Vocational Trade and Industrial Education supervisors, teachers, and co-ordinators held at the Short Course Center, A. & M. College, Stillwater, Okla., June 6 to 10.

Supervisors, teachers, and co-ordinators representing 175 programs attended this meeting.

Mr. Ludtke's 30 years of experience in trade and industrial education at all levels, and his present position in Washington qualifies him to render most valuable counsel in the study of present trends, problems, and objectives in this field of training. He has worked closely with State Departments and schools for the past 15 years throughout the United States and particularly in the 12 Southern Regional States of which Oklahoma is a member.

Dr. Oliver S. Willham, president of A. & M. College, gave the welcome address to open the Workshop on Monday morning.

Other speakers were included at the first general session.

Leaders who appeared on the general program included Charles Hassing, president of Citizens State Bank, Hugo; J. B. Perky, Oklahoma State Director of Vocational Education; and Joseph E. Vargo, educational director, Crow Electri-Craft Corp., Vincennes, Ind.

In the school shop as in industry, this rugged Logan "6560" performs impressively on every operation. On heaviest cuts, or at maximum speed, it turns the work *smoothly*, quietly, with precision results. Superior performance is designed, engineered and built into it.

The Variable Speed Drive provides instant spindle speed correction. The oversize spindle, with 1⅛" bore, turns on a ball bearing mounting that needs no adjustment within the full range of 38 to 1200 rpm. The bed is a wide, deep special alloy casting, extra heavy and resistant to both internal and external stresses. The two V-ways and two flat ways are precision ground. Extra strength and weight throughout, plus dynamic balancing of the complete lathe practically eliminates vibration. Moderate price and low cost operation make the "6560" outstanding in economy as well as in precision performance. Write for Bulletin 14-L, giving a full description.

SPECIFICATIONS AND FEATURES

14½" swing over bed
9" swing over saddle
1⅛" spindle hole
1" collet capacity
40" between centers

Variable Speed Drive
Ball Bearing Spindle
38 to 1200 rpm
Two-V-way, Two-flat way, Precision Ground Bed
Precision Carriage

LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

LOGAN ENGINEERING CO.
Lawrence and Lamon Ave., Chicago 30, Ill.

MARYLAND VOCATIONAL AND PRACTICAL ARTS ASSOCIATION

The annual meeting of the Maryland Vocational and Practical Arts Association will be held on Friday, October 21, 1955, at 6:00 p.m., at the Mergenthaler Vocational-Technical High School, Baltimore, Md.

Dr. R. Lee Hornbake, the president, announces that there will be a special recognition ceremony for vocational education and practical arts teachers.

The main address will be given by Dr. Irving H. Siegel, member of the Council of Economic Advisers. His topic will be "Implications of Technological Change for Education and Occupation."

NEW OFFICERS ELECTED

The Connecticut Industrial Arts Association has recently elected new officers for the coming two-year period. They are: president, William G. England; vice-president, Richard Terry; 2nd vice-president, Edward Cook; 3rd vice-president, William Burns; secretary, Carl Hubachek; and treasurer, Ernest Bono.

The following representatives were elected by their respective groups to represent them at the state level: Lester Roy, New Haven County Industrial Arts Association; James Eisenhaure, Central Connecticut Industrial Arts Association; and Byron Berry, Fairfield County Industrial Arts Association. — *Carl H. Hubachek, Secretary.*

INDUSTRIAL ARTS EXHIBIT

The Massachusetts Industrial Education Society held its Convention at Natick High School Saturday, May 14, opening with an exhibit of 500 articles, constructed by members of the industrial arts classes of many schools throughout the state.

The exhibits were viewed by nearly 1000 during the day and judging was held in the afternoon. The winners will receive awards soon and 50 of them will have their exhibits selected to be sent to the national contest which is sponsored by Ford Motors.

The meeting came to a close in the auditorium when a testimonial was given to James Hammond, director of industrial arts, at Fitchburg State Teachers' College. Speaking at the testimonial were Charles Avadanian, president of the Society; Arthur Stickler, head of the Natick industrial-arts department and convention chairman; E. Davis Woodbury, superintendent of schools; James Shannon, general manager of the Ford parts plant in Natick; Ralph Weston, president of the Fitchburg State Teachers' College; Wes Ketcham, consultant of industrial arts for the state of Connecticut and the honored guest, James Hammond.

James Hammond was the recipient of many gifts including an engraved wrist watch by the members of the Massachusetts Industrial Education Society. — *Arthur G. Stickler.*

LOS ANGELES COUNTY INDUSTRIAL EDUCATION ASSOCIATION

The Institute Planning Committee of the Los Angeles County Industrial Education Association, met on January 25, 1955, to plan

(Continued on page 6A)

The All-New DELTA 14" Drill Press
Floor Model
Bench Model
Multiple Spindle Set-ups
The world's most widely used industrial drill press line now finer than ever!

New in all these ways!

New IN SAFETY: Many new safety features such as fully enclosed spindle that has *side opening* for easy changeover, enclosed belt and pulley guard, safety-recessed push button starter up front available as an accessory make the new Delta 14" drill press safer than ever for student use.

New IN CONVENIENCE: Quick-set depth gage for faster, more accurate depth of penetration readings . . . Self-locking Depth Stop with micrometer settings calibrated in steps of .002" . . . Tilting Table with positive stops and calibrated scale . . . those are just a few of the new features which make it so easy to do precision work on the new Delta 14" drill press.

New IN VERSATILITY: You can teach countless operations on the new 14" Delta—drilling, counterboring, tapping, routing, shaping and dozens of other jobs. You can use it on wood, metal, plastics. In fact, you'll find the new Delta 14" Drill Press one of the most useful and versatile teaching aids in your shop.

Remember, ALL Delta Tools PROVIDE DOUBLY-VALUABLE TRAINING because they are the SAME tools with which many of your students will earn their living after leaving school!

See It Now! There's so much that's new and better about the new Delta 14" Drill Press that you've got to see it to appreciate it. *Call your Delta Dealer for a demonstration (he's listed in the classified pages of your phone book under "TOOLS" or "MACHINERY") or send the coupon.*

DELTA QUALITY POWER TOOLS

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☐ Please send me complete catalog information on new Delta 14" Drill Press.

Name_____ Title_____

School_____

Address_____

City_____ County_____ State_____

ASSOCIATION NEWS

(Continued from page 4A)

the institute program for the school year 1955–56. This committee is under the direction of Ed. Roberts of Whittier High School, Whittier, Calif.

The proposed schedule is as follows:

1. October 17, 1955, Monday night dinner meeting with Dr. C. C. Trillingham, Los Angeles County Superintendent of Schools, as principal speaker. Dinner will be served at 6:30 p.m.
2. December 9, 1955, Friday night dinner meeting, with a *Do It Yourself Program.*
3. February, a proposed field trip.
4. May 18, 1956, Friday night, Ladies' Night and dinner meeting.

Exact time and places of these meetings will be announced at a later date.

THE C.I.E.A. CONVENTION

The California Industrial Education Association held its annual convention in San Diego on March 18 and 19, 1955. Aside from many outstanding panels, workshops and section meetings, two main features predominated the affair. The California "Ship" and the many exhibitors constituting it provided a wealth of diversified commercial exhibits. Teachers flocked to San Diego from points nearly one thousand miles away.

A good representation came in from Arizona to study new materials and ideas. The other feature was the extensive display of school exhibits. The convention is becoming recognized by teachers and administrators alike as the place to get new project ideas, ideas for teaching aids, and an opportunity to get a panoramic view of industrial education.

"Automation," "Implications for Industrial Education in this Atomic Age," and "Writing for Technical Publications," are just a few of the topics for speeches and discussion during the two-day meeting.

The 1956 convention will be held in Bakersfield, Calif., where a fabulous junior college has recently been completed.

UNIVERSITY OF MICHIGAN EVENTS

The following is a schedule of six conferences and institutes for teachers of vocational education and practical arts subjects to be held during the coming school year 1955–56.

The third annual institute for general shop teachers will be held October 22, 1955; the third annual institute for teachers of woodwork, November 5, 1955; the third annual institute for teachers of auto mechanics, February 25, 1956; fourth annual institute for drafting teachers, April 7, 1956; fourth annual conference for teachers of driver education, April 28, 1956; and fourth annual institute for machine shop teachers, May 12, 1956.

A number of University units are co-operating in the planning of these conferences, according to Prof. Ralph C. Wenrich, chairman of the department of vocational education and practical arts. Included among them are the extension service; the department of wood technology in the school of natural resources; the departments of engineering drawing, production engineering, and mechanical and industrial engineering in the college of engineering; and the department of vocational education and practical arts in the School of Education.

E.P.T. FRATERNITY

Eighteen new members were admitted into the Epsilon Pi Tau Honorary fraternity at The Stout Institute, Menomonie, Wis., on March 26, 1955.

Four faculty members, Mr. Seifert, Mr. Klatt, Dr. Wall, and Mr. Wiehe, and 14 students, Clinton Byrnes, Stanley Suk, Marlon Scharf, Joel Russell, James Rowsam, Donald Pritchard, Robert Olstrum, Henry Moerschel, Joel Lamke, Joseph Koch, Donald Hagen, Maurice Ellis, Robert Duren, and George Clark fulfilled the entry requirements.

The formal initiation took place in the club room of the Union Building. A banquet was held at Hotel Marion at noon.

♦ The third annual fall convention of the West Virginia Industrial Arts Association will be held October 7 and 8 at the West Virginia State College at Institute, W. Va., with Dr. Kenneth McFarland as principal speaker.

The theme of the convention will be "Enriching the Industrial Arts Teacher through Philosophy and Technique."

Commercial exhibitors wishing to show will be provided booth space without cost.

Dr. F. J. Lacy of the West Virginia State College is in charge of arrangements.

The officers for 1955–56 are: president, Lawrence E. Hayes, Roosevelt Junior High School, Charleston; vice-president, Anthony L. Kolitsch, Philippi High School; and secretary-treasurer, E. Dickson Willis of West Junior High School, Huntington.

♦ Officers elected by the Minnesota Industrial Arts Association to serve the two-year term 1954–56 are: president, Robert M. Worthington, St. Paul, Minn.; vice-president, Malcolm W. Doane, St. Cloud, Minn.; secretary-treasurer, Frederic H. Rowell, Minneapolis, Minn.

There's Extra Value in Millers Falls Screw Drivers
It's on the job that blade strength and durability are put to the test — and Millers Falls screw drivers have proved on the job that their extra quality pays off in better performance and longer life. In every detail, these basic tools are built to exacting standards of craftsmanship. Each blade is hammer-forged from tough, high grade steel — is carefully heat-treated and cross ground — is individually torque tested.
No matter what the need, there is a Millers Falls screw driver to meet it. Complete line includes automatic, ratchet, offset and plain types. All lengths.
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The Mark of Superiority
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These **NEW** *Walker-Turner "Light-Heavyweights"*

LEND PROFESSIONAL CRAFTSMANSHIP TO YOUR STUDENTS' HANDS!

Every day your students use these fine Walker-Turner Saws, they're learning to have a respect for precision cutting. What's more, they're learning to do the job right the *first* time.

No question about it — to give your students the skills and confidence you want them to take out into the workaday world, you have to teach with the machine tools they'll find when they go to work on a job. They'll find plenty of Walker-Turners — you can be sure of that.

See that your students have the advantage of experience with all of the outstanding features of these new Walker-Turner Light-Heavyweight Saws. Motor mounting and arbor *tilt as a unit*. Guard and splitter are always lined up with the blade for protection at any angle. Arbors on all models are mounted on precision ball bearings.

These rugged, new Walker-Turners give you performance and accuracy you'd normally find only in much heavier, more expensive machines.

Write today for catalog sheets, and the name of your nearest distributor.

No. 2221 — 10" Tilting Arbor Saw — Capacity: 3⅛" with 10" blade; 2⅛" at 45°; with 6" dado, 1⅛". Speed: 3800 rpm. Table: 32½" deep x 32" wide; 32½" x 45¾" with extension. With 10" combination blade, extension tables, miter gauge, guard, splitter, motor pulley and belt (without motor) $297.00.

No. 2121 — 8" Tilting Arbor Saw — Capacity: 2⅝" with 8" blade, 1½" at 45°; with 6" dado, 1⅜". Spindle speed: 4000 rpm. Table: 23" deep, 19" wide; 23" x 37" with extensions. With 8" blade, extension tables, miter gauge, guard, splitter, belt, motor pulley and sub base (without motor) $192.00.

No. 2450 — 14" Tilting Arbor Saw — Capacity: 5" with 14" blade, 3½" at 45°; with 8" dado, 2". Speed: 3450 rpm. Table: 38¾" deep x 48" wide with extension. With 14" combination blade, extension table, miter gauge, splitter, guard, including 5 hp 220/440 volt 60 cycle 3-phase motor, with push button station. $946.50.

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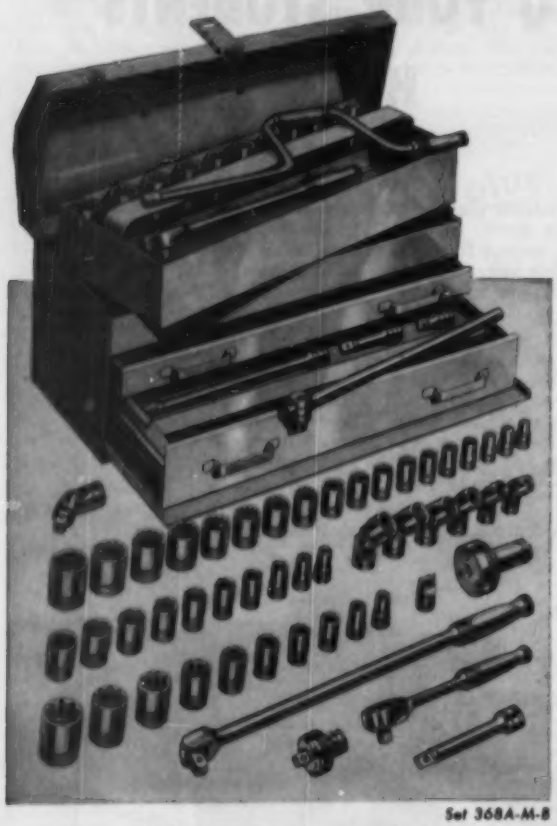

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Oliver DISK AND SPINDLE Sander

A sturdy, low-cost Sander . . . ideal for school shops

This accurate, handy Sander is most helpful in school shops. Has 15-inch disk with table that tilts 45° down, 25° up. Two gauges enable you to sand angular and circular work smoothly and without fuss. Ask for folder No. 182-D.

A 6-inch belt sanding attachment on opposite side of motor can be operated in a vertical or horizontal position. Especially effective on straightline work. Write for folder No. 182-DB.

OLIVER MACHINERY COMPANY
Established 1890 GRAND RAPIDS 2, MICH.

DAKE PRESSES for School Shops

Shop training is most helpful when your pupils use the same practical presses they are apt to find when they work after graduation.

DAKE HYDRAULIC PRESS Model 25 H

Includes pressure gauge, hand wheel for rapid advance, automatic ram return, and table lifting device. 25 tons capacity.

DAKE ARBOR PRESSES

Have large opening and slotted table plates. Available in single and compound leverages, with capacities from 1 to 25 tons.

Catalog No. 350 describes Dake Presses suitable for school shops. Write for a free copy.

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FIRST—With an UNCONDITIONAL GUARANTEE without time limit restrictions.

FIRST—Woodworking vises with 2¼" STEP to fit flush on standard 2¼" bench top.

FIRST—Woodworking vises with TUBULAR STEEL HANDLES at no additional cost.

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- ✔ All new center mounted fence with positive lock steps at 45° and 90°
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- ✔ ALL NEW cutterhead guard for safe operation. Removal for rabbiting.
- ✔ Three knife safety type cutterhead, fitted with High Speed Steel knives.
- ✔ All cast iron construction.
- ✔ Totally enclosed heavy steel floor stand.
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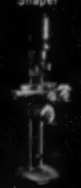
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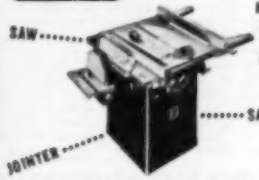

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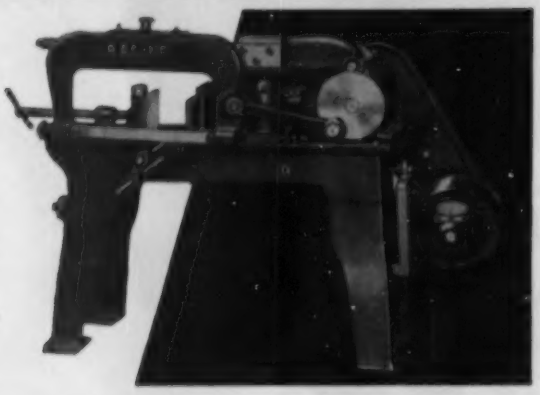

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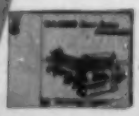

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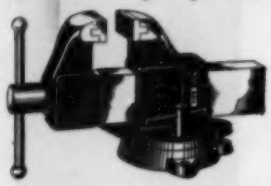

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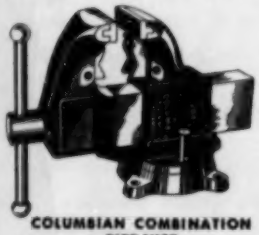

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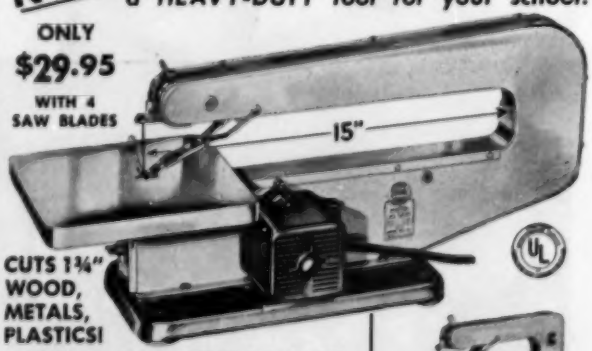

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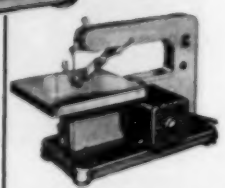

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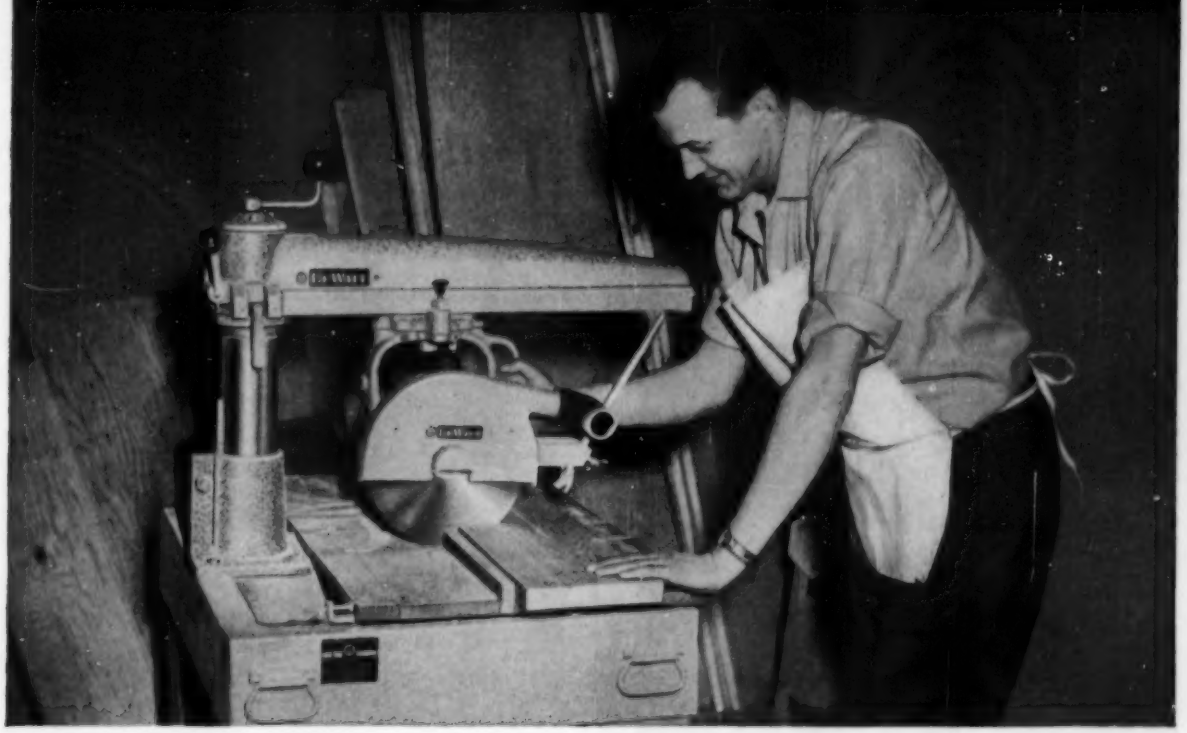

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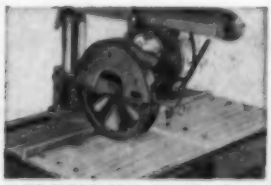

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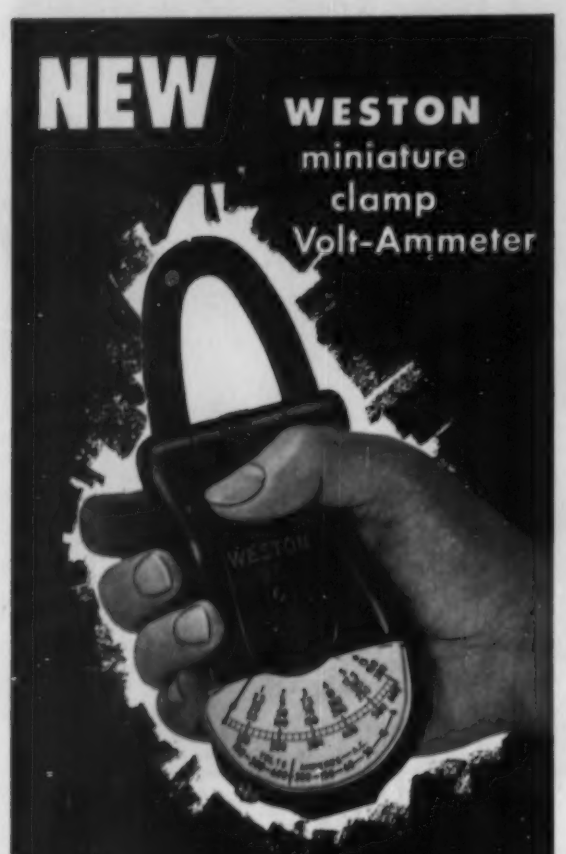

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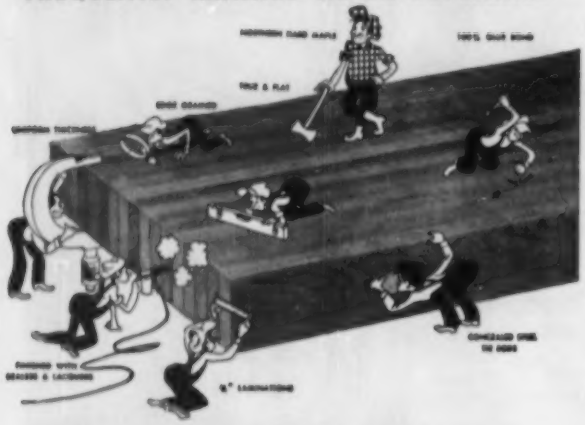

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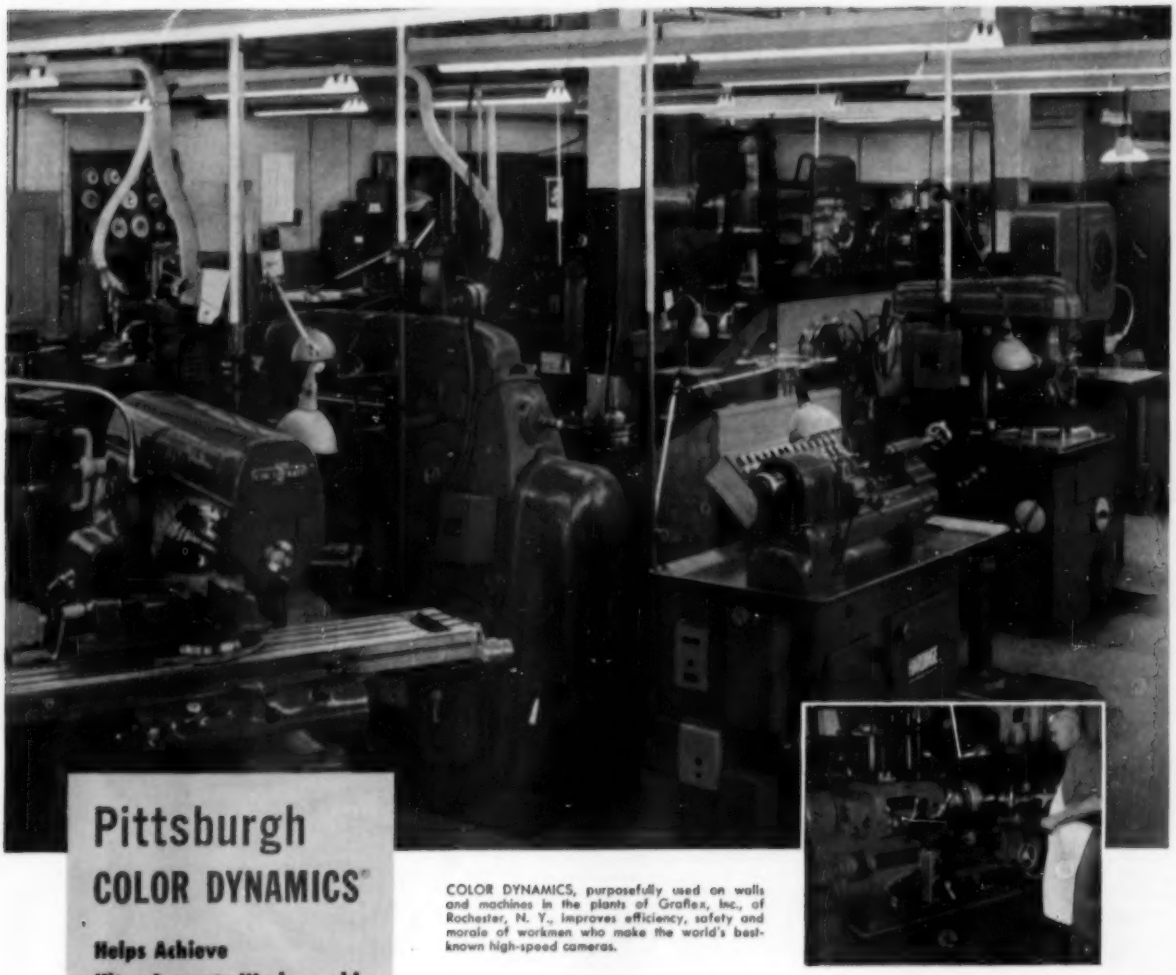

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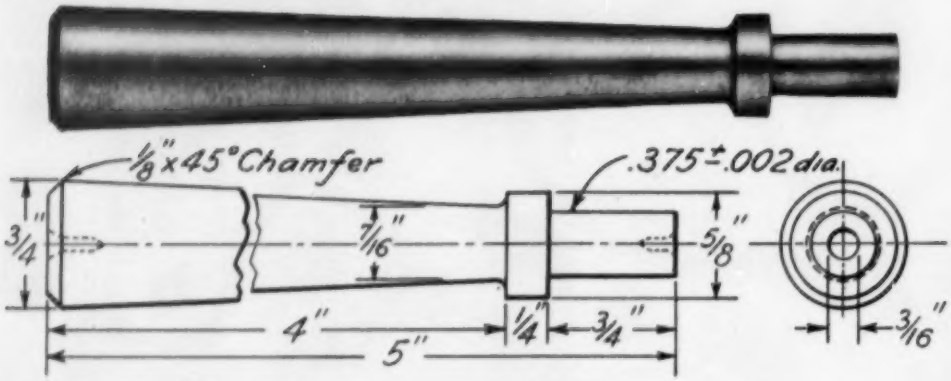
HOW-TO project for the School Shop

—by NICHOLSON FILE COMPANY

NO. 11 OF A SERIES

MAKING A TAPERED HANDLE



In making this tapered handle for lathe, drill press, etc., the school-shop student learns that metal can be removed with precision, and an extremely smooth finish acquired, using Nicholson files on lathe work.

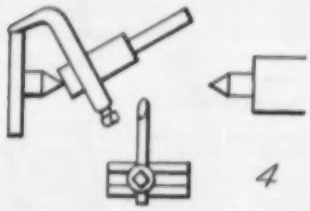
CAUTION: the student is warned to roll up his sleeves when working with a lathe, and to be sure his necktie and other clothing are not loose so that they might be caught in the machine.

Material: 1 piece 7/8" dia. x 5 1/8" CRS.

Tools: Combination drill and countersink, 6" rule, 8" outside calipers, 3" outside calipers, 3" hermaphrodite calipers, rt. hand round nosed tool, rt. side tool, 2" dividers, 1" lathe dog, 1/2" lathe dog, piece of copper, 8" Nicholson Mill Bastard file, 10" Nicholson Long Angle Lathe and/or 10" Mill Bastard file, layout dope.

SCHEDULE OF OPERATIONS

1. Center work in 3-jaw universal chuck or centering machine. Drill 3/16" dia. centering holes with combination drill and countersink. **2.** Set spindle speed to approx. 200 RPM, giving cutting speed of 50 FPM. Face ends to 5 1/64" with rt. side tool and hand feed. **3.** Recenter work to 3/16" dia. center holes. Finish square to 5" long, using 300 RPM and hand feed.

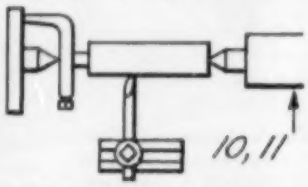


4. Take roughing cut 3/4 ÷ 1/64" caliper measurement, using 200 RPM with power feed of .010 per rev. Turn half way up stock, shut off power, stop machine. Remove work without disturbing setting, and repeat same procedure on other end. CAUTION: Never stop machine while tool is embedded in cut. This might chip the tool. **5.** Paint end with layout dope. Mark off 1 1/4" with 6" rule and hermaphrodite calipers. **6.** Set spindle speed to approx. 300 RPM and power feed to approx. .010. With rt. hand round nosed tool cut 5/8" dia. caliper measurement to within 1/32" of 1 1/4" caliper mark, taking 2 or 3 cuts. **7.** Lay off 3/4" on 5/8" dia. and turn to 25/64". Finish turn to .375 ÷ .003. **8.** Set spindle speed to 550-650 RPM. With Nicholson 8" Mill Bastard, file 5/8" dia. to remove tool marks, and file 3/8" dia. to .375. **9.** Offset tailstock away from you .195 or 3/16", using 2" dividers and 6" rule.

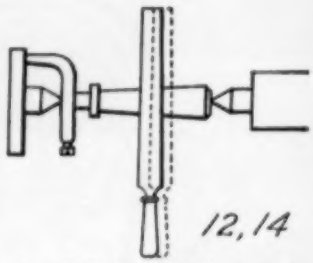
NOTE:

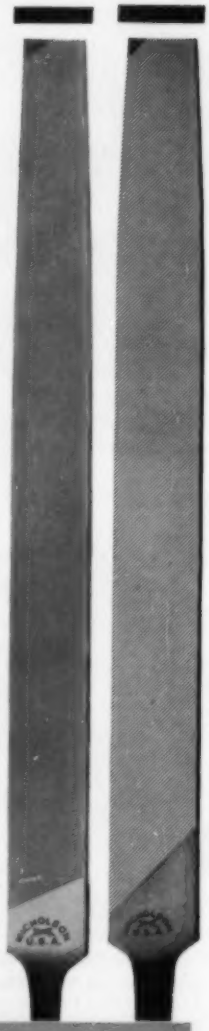
$$\frac{\text{Total length of work}}{\text{Length of taper section}} \times \frac{\text{Difference in diameters}}{2} = \text{Offset}$$

$$\frac{5}{4} \times \frac{5/16}{2} = \frac{5}{4} \times \frac{.3125}{2} = .195 \text{ or } 3/16"$$



10. Mark off 4" on 5/8" dia. for tapered section, using layout dope, 6" rule, hermaphrodite calipers. **11.** Mount dog on 3/8" dia. and protect it with piece of copper. With 300 RPM and .010 feed, start cut approx. 1 1/4" up on handle by touching tool to work. Turn on power feed. Note that tool cuts deeper as it moves along work. Shut off power feed when tool is within 1/32" of 4" line. Repeat procedure, moving tool back each time until entire length of handle is made. With power feed of .010, take finishing cut, 3/4" caliper measurement at extreme end of handle. **12.** Realign tailstock so center holes will not be enlarged. **13.** Set rt. side tool to approx. 45° and chamfer end of handle to 1/8" across flat. **14.** Finish file taper with Nicholson 10" Long Angle Lathe or 10" Mill Bastard file. Take long, even strokes to remove tool marks. Do not bear hard on file or it will bite into work and load up, scratching work. Take your time. Perfect your filing technique. Note the satin-smooth finish the Nicholson Long Angle Lathe or Mill Bastard file can produce when properly used. **15.** Break all sharp corners with Nicholson 10" Mill Bastard file. Check work with instructor.





The Nicholson 10" Mill Bastard and 10" Long Angle Lathe files are shown approximately half size. The Mill Bastard in 8" size is not shown. These and hundreds of other types and sizes are readily available, in Nicholson or Black Diamond brand, through industrial suppliers and hardware dealers.

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Industrial Arts and Vocational Education
The Shop Teachers' Professional Magazine
OCTOBER 1955

Learn How to Avoid These –

Danger Zones in Shop Safety*

STUART A. ANDERSON
Director of Teacher Training
Eastern Illinois State College
Charleston, Ill.

It is a commonly accepted belief that man is his own worst enemy and that any accident, from stubbing one's toe to the explosion of an atomic plant, can be prevented by human alertness. This observation is particularly important for shop teachers who generally accept as a course objective the safe and proper use of tools and machines. It is recognized that accidents are coming to be a major economic problem as well as a vitally human one. And yet how often one sees a shop teacher who has lost a portion of his finger or suffered some other damaging accident during his teaching career. This is one of the occupational hazards of being a shop teacher.

High school students taking shopwork, prospective industrial education teachers now in college, and experienced shop instructors: all have a real stake in this vexing problem of shop safety. Objective information obtained from a study of accidents sustained by shop teachers on-the-job sheds some light on this problem and also points out certain *danger zones* in shop safety. If you find statistics boring, perhaps you'd like to guess the answers to some of these questions:

1. What part of the body is most likely to be injured?
2. What machine causes the most accidents?
3. What shop is the most dangerous?
4. Is age a factor in accidents?
5. Are there certain times of the day, week, or year when most accidents occur?

*Analytical study of accidents sustained by 58 shop teachers on-the-job. Results should be of particular interest to teachers of industrial subjects and to colleges preparing teachers in this area.

The Sample

Approximately sixty teachers of industrial subjects, most of whom were attending summer school at The Stout Institute, reported on accidents which they had sustained in the school shop. This sample, although somewhat selective, represents a wide range of states, communities, schools, and shops.

Location of Injury

Injuries to fingers accounted for more than three fourths of the accidents reported by 58 shop instructors as may be seen in Table 1. More than one half of these affected the right hand, while approximately one fifth injured the left hand. The head received nearly 7 per cent of the accidents. Injuries to hands, not including the fingers, only comprised slightly more than 10 per cent of those reported. Two men listed eye injuries, one an ear injury, and another a body injury. From these figures it can be seen that the hands and fingers were the principal parts of the body injured in shop accidents.

TABLE 1. Body Location of Injury

Location	Number	Per cent
Finger, right hand	32	55.2
Finger, left hand	12	20.7
Head	4	6.9
Right hand	3	5.2
Left hand	3	5.2
Eye	2	3.4
Ear	1	1.7
Body	1	1.7
Total	58	100.0

Cause of Accident

Nearly two thirds of all accidents were caused by carelessness according to reports from those injured. Mechanical failure explained 12 per cent of the accidents, while inadequately guarded machines accounted for 3.4 per cent as may be seen in Table 2. Two accidents were directly attributed to students who interrupted the teacher while he was operating a machine. Other reasons reported were: horseplay, just happened, every precaution used, prevented injury to others, distracted from work, and careless use of machine by an outsider. A summary of these causes reveals that nearly 85 per cent of the accidents could be attributed to the *human element*.

TABLE 2. Cause of Accident

Cause	Number	Per cent
Carelessness	37	63.8
Mechanical failure	7	12.1
Interrupted by students	2	3.4
Machine not properly guarded	2	3.4
Other reasons	7	12.1
Not stated	3	5.2
Total	58	100.0

Shop in Which Injury Occurred

More accidents occurred in the wood-

shop than in all the other shops combined. While approximately three fourths of the accidents were sustained in the woodshop, nearly 14 per cent were reported in the metal shop, 7 per cent in the print shop, and one each in auto mechanics and drafting, according to the information presented in Table 3.

TABLE 3. Shop in Which Accident Occurred

Shop	Number	Per cent
Wood	44	75.9
Metal	8	13.8
Print	4	6.9
Auto	1	1.7
Drafting	1	1.7
Total	58	100.0

Machine or Tool on Which Injury Occurred

Further investigation as to the machine or tool which caused the accident reveals that the circular saw was the principal offender. While 15 out of 35 accident reports identified this machine, 6 named the jointer, and 2 the wood chisel as may be seen in Table 4. One injury each was attributed to the following machine or tool: wood lathe, band saw, glass cutter, acetylene regulator, die filing machine, drill press, grinder, printing press, paper cutter, and gas engine. The machine or tool responsible for the injury was not identified in 23 of the 58 reports.

TABLE 4. Machine or Tool on Which Injury Occurred

Machine or Tool	Number
Circular saw	15
Jointer	6
Wood chisel	2
Wood lathe	1
Band saw	1
Glass cutter	1
Acetylene regulator	1
Shaper	1
Milling machine	1
Die filing machine	1
Drill press	1
Grinder	1
Printing Press	1
Paper cutter	1
Not stated	23
Total	58

Kind of Work Being Done

Nearly 50 per cent of the accidents reported by 58 industrial-arts teachers were sustained while doing regular class work as may be observed in Table 5. Injuries received while doing shop maintenance, a primary responsibility of most shop teachers, accounted for 16.9 per cent of those listed while 18.6 per cent were injured while doing personal work. Nearly 14 per cent of the injuries were experienced while the instructor was doing production work for the school. One teacher stated that he was injured while supervising.

TABLE 5. Kind of Work Being Done at Time of Accident

Kind of Work	Number	Per cent
Regular classwork	29	49.2
Personal work	11	18.6
Shop maintenance	10	16.9
Production work	8	13.6
Supervision	1	1.7
Total*	59	100.0

* One teacher reported both personal and production work.

Age and Years of Teaching Experience at Time of Accident

Is there any relationship between the number of years of teaching experience and accidents sustained? Nearly 50 per cent of the accidents reported occurred within the first three years of teaching according to the data recorded in Table 6. The highest incidence, 17.3 per cent, was with teachers who had less than one year of teaching experience. Nearly 30 per cent of the accidents were reported by instructors with ten or more years of experience. Generally speaking, however, the more experienced teachers sustained a smaller proportion of serious accidents, than did beginning teachers.

Approximately one half of the accidents reported were sustained when the teacher was under 30 years of age according to the data shown in Figure 1. Accidents to men 40 and over accounted for nearly 25 per cent of the total, while those in the 30–39 age group comprised slightly more than one fourth. The 25–29, and the 20–24 groups each sustained about 25 per cent of the accidents. The fewest injuries were reported in the 60–64 and 45–49 age intervals with only one accident for each. Other comparatively safe periods, with four accidents each, were: 40–44, 50–54, and 55–59.

Time of Year, Week, and Day Accident Happened

What time of the year did most of these accidents occur? According to the information available in Figure 2, the end of the school year appears to be a danger zone with nearly 40 per cent of the accidents happening in May and June. Other danger periods were: March with eight accidents; December, seven; November, six; October, five; and April with four. The safest months appear to be September, January, and February with only one accident each month. Approximately 25 per cent more accidents occurred the second semester than the first.

Monday and Friday appear to be the safest days of the regular school week. Most of the accidents occurred on Tuesday, 24.4 per cent, followed by Wednesday and Thursday with 22 per cent each according to the analysis shown in Figure 3. It is interesting to note that nearly 10 per cent of the teachers were injured on a Saturday.

TABLE 6. Number of Years of Teaching Experience at Time of Accident

Years	Number	Per cent
None	10*	17.3
One	4	6.9
Two	8	13.8
Three	6	10.3
Four	4	6.9
Five	2	3.4
Six	1	1.7
Seven	2	3.4
Eight	4	6.9
Nine	0	..
10–14	2	3.4
15–19	6	10.3
20–24	1	1.7
25–29	4	6.9
30–34	2	3.4
35–39	1	1.7
Not stated	1	1.7
Total	58	99.7

* Includes two men who were doing student teaching.

Age Range	Frequency	Per Cent
60–64	●(1)	1.7
55–59	●●●●(4)	6.9
50–54	●●●●(4)	6.9
45–49	●(1)	1.7
40–44	●●●●(4)	6.9
35–39	●●●●●(5)	8.6
30–34	●●●●●●●●●●(10)	17.3
25–29	●●●●●●●●●●●●●●(14)	24.1
20–24	●●●●●●●●●●●●●●(14)	24.1

Fig. 1. Age at time of accident

Month	Frequency	Per Cent
September	●(1)	1.8
October	●●●●●(5)	9.3
November	●●●●●●(6)	11.1
December	●●●●●●●(7)	13.0
January	●(1)	1.8
February	●(1)	1.8
March	●●●●●●●●(8)	14.8
April	●●●●(4)	7.4
May	●●●●●●●●●●●●●(13)	24.1
June	●●●●●●●(7)	13.0
July	●(1)	1.8

Fig. 2. Month in which accident occurred

Day	Frequency	Per Cent
Monday	●●●●(4)	9.7
Tuesday	●●●●●●●●●●(10)	24.4
Wednesday	●●●●●●●●●(9)	22.0
Thursday	●●●●●●●●●(9)	22.0
Friday	●●●●●(5)	12.2
Saturday	●●●●(4)	9.7

Fig. 3. Day of week accident occurred

More than two thirds of the shop accidents occurred during the regular school day as may be seen in Table 7. However, more than 17 per cent of the men received injuries after school in the

afternoon, and nearly 7 per cent in the morning before the regular school day. Approximately 9 per cent were hurt while working during the week end.

TABLE 7. Time of School Week in Which Accident Occurred

Time	Number	Per cent
Regular school day	39	67.2
After school	10	17.2
Week end	5	8.6
Before school	4	6.9
Total	58	99.9

An analysis of the time of day during which the shop accidents occurred is shown in Figure 4. The highest incidence, 28.3 per cent, was the hour from ten to eleven, while 17 per cent were reported from eleven to twelve. Approximately 45 per cent of all accidents took place in this two hour morning period. In the afternoon most of the accidents, 24.5 per cent, happened between two and four o'clock. The fewest accidents during the regular school day were reported between eight and ten in the morning and during the one and four o'clock periods with four accidents each hour. One accident each were recorded between seven and eight in the morning, and between five and six in the afternoon.

Hour	Frequency	Per Cent
7– 8	●(1)	1.9
8– 9	●●(2)	3.8
9–10	●●●(3)	5.7
10–11	●●●●●●●●●●●●●●●(15)	28.3
11–12	●●●●●●●●●(9)	17.0
12– 1	●(1)	1.9
1– 2	●●●●(4)	7.5
2– 3	●●●●●●●(7)	13.2
3– 4	●●●●●●(6)	11.3
4– 5	●●●●(4)	7.5
5– 6	●(1)	1.9

Fig. 4. Time of day accident occurred

Selected Questions

Only two of the 58 shop teachers who reported injuries were left-handed. Fifty-six were right-handed, as shown in Table 8.

In this same table it may be noted that nearly 14 per cent of the men were giving a demonstration at the time of the accident.

Nearly 80 per cent of the industrial-arts instructors indicated that they had not received formal instruction relative to the safe and proper use of the machine which caused the accident. This observation would seem to further justify instruction in shop safety.

When asked, "Was the accident entirely your fault?" opinion was quite evenly divided. However, slightly more than 50 per cent admitted that they were at fault.

More than 50 per cent stated that the machine on which the injury was received was properly guarded, while 34.5 per cent indicated that the machine was improperly guarded. More than 10 per cent did not answer this query, while 3.4 per cent were injured on hand tools.

Although a first aid kit was missing in 17.2 per cent of the shops, the majority, 82.8 per cent, contained this equipment.

While medical expenses were paid for nearly 57 per cent of the instructors, only 21.4 per cent received any disability compensation. More than 30 per cent did not have the medical expenses paid, while more than 70 per cent received no disability compensation. The five men who reported the amount of disability compensation received gave the following figures: $84, $150, $190, $400, and $540. In each of these five cases a finger injury was sustained.

TABLE 8. Selected Questions Related to Accident

Questions	Reply	Number	Per Cent
1. Are you right-handed?	Yes	56	96.6
	No	2	3.4
2. Were you giving a demonstration at the time of the accident?	Yes	8	13.8
	No	50	86.2
3. Did you receive formal instruction in a teacher training institution relative to the safe and proper use of the machine which caused the accident?	Yes	12	20.7
	No	46	79.3
4. Was the accident entirely your fault?	Yes	30	51.7
	No	28	48.3
5. Was the machine properly guarded?	Yes	30	51.7
	No	20	34.5
	No Reply	6	10.3
	No Machine	2	3.4
6. Was there a first aid kit in the shop?	Yes	48	82.8
	No	10	17.2
7. Were medical expenses paid?	Yes	33	56.9
	No	18	31.0
	No Reply	7	12.1
8. Did you receive disability compensation?	Yes	13	21.4
	No	41	70.7
	No Reply	4	6.9

Summary

In summarizing the findings of this investigation of accidents sustained by industrial-arts teachers on-the-job the following statements seem pertinent:

1. More than 85 per cent of the injuries reported by shop teachers proved injurious to the hands and fingers.
2. Nearly two thirds of the accidents were caused by carelessness.
3. Approximately one half of the industrial-arts teachers believed that the accident was entirely their own fault.
4. More than 75 per cent of the accidents reported were sustained in the woodwork shop.
5. More accidents occurred on the circular saw than on any other single machine or tool.
6. Approximately one half of the accidents happened when the teacher was doing regular classwork; nearly one third were sustained while doing shop maintenance and production work for the school; and about 17 per cent while the teacher was engaged in personal work.
7. The incidence of accidents was highest, nearly 50 per cent, during the first three years of teaching.
8. Nearly 50 per cent of the accidents were sustained by shop teachers when they were under thirty years of age.
9. The closing months of the school year, May and June, appear to be the *danger zones* for shop teachers. The second semester is more dangerous than the first.
10. The fewest accidents during the school week were reported on Monday and Friday, while Tuesday, Wednesday, or Thursday were the *dangerous days.*
11. Nearly 70 per cent of the accidents reported occurred during the regular school day, while approximately 30 per cent happened before school, after school, and during the week end.
12. The most *dangerous hours* of the day were from 10 to 12 in the morning.
13. Nearly 14 per cent of the teachers were giving demonstrations at the time of the accident.
14. Approximately 80 per cent of the shop teachers stated that they had not received formal instruction relative to the safe and proper use of the machine on which they were injured.
15. More than one third of the machines on which accidents occurred were not properly guarded.
16. First aid kits were available in a majority, 82.8 per cent, of the shops.
17. Medical expenses were not paid in nearly one third of the accidents reported.
18. Slightly more than one fifth of the injured teachers received disability compensation.

A lightweight steel joist for supporting floors and roofs of modern buildings has been developed by U. S. Steel's American Bridge division. — *Industrial Research Newsletter.*

A Good Public Relations Effort —

Recognizing Industrial Leaders

BENJAMIN J. NOVAK
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Philadelphia, Pa.
also
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Annually since 1943, the Murrell Dobbins Vocational-Technical School in Philadelphia has been honoring an individual who has become outstanding in his chosen vocation, and displayed sensitivity and ideals of service to the community. The idea, first suggested by a staff member,* has been developed into the activities culminating with the "Pioneer of Industry" award.

The date devoted to the purpose is late in May or June, and is known as "Murrell Dobbins Day." On this occasion the memory is kept alive of Murrell Dobbins — bricklayer, contractor, and member of the Philadelphia board of education, whose foresight and exertions resulted in the opening in 1906 of the Philadelphia Trades School, the first free public trade high school in the United States. It is fitting that the modern eight story, twelve-million dollar vocational school bears his name. In paying formal tribute each year to Dobbins, it seems appropriate to recognize a present-day leader of industry who exemplifies some of his rare qualities.

Pioneer of Industry Award Plaque
Made and presented by the Murrell Dobbins Vocational-Technical School

Connie Mack, president of Philadelphia Athletics Baseball team, receiving Pioneer of Industry Award from Mr. J. Norwood Baker, principal, and Edward Hansbury, president, Student Government, at Murrell Dobbins Vocational-Technical School, Philadelphia

*The late J. Wesley Miller, former vice-principal.

Candidates are recommended to a school committee which sifts their qualifications, of which material success is not the major factor. As much as possible, the recipient of the award is one whose educational background corresponds to the sort that is being acquired by our own students. The thought is to display an example of the possibilities which can be realized from a vocational education. To be sure, our beloved neighbor, Connie Mack, represents the unusual industry of baseball. He has, however, provided our students with inspiration and encouragement, and besides providing wholesome recreation, has employed several of our boys in his highly skilled vocation. We feel no apology, therefore, in having named him our "Pioneer of Industry" award winner for 1949.

The individual chosen is invited for the formal presentation ceremonies held before the student body in the school auditorium. Platform guests include the winner's family and staff representatives, winners from previous years, members of the board of education and board of superintendents, the vocational advisory committee, and leaders in vocational and general education. The

John B. Kelly, Philadelphia, receives Pioneer of Industry Award at Dobbins Vocational-Technical School from Joan Fierro, president of Student Council
— Photograph, courtesy of Philadelphia Daily News

press and radio are in attendance, giving coverage in these media.

The award itself is a wood and felt backed metal plaque a foot in diameter, bearing the name of the winner. The design was developed in the school's commercial art department. The wood base is made in the cabinetmaking shop, and the pattern is a product of the patternmaking shop. The castings are poured each year in the foundry shop, and are finished in the machine shop.

The acceptance speeches to date generally have been somewhat autobiographical, of unquestioned sincerity, and reveal the hopes, ideals, and life values of the speaker. They have been within the comprehension of the students, and it is hoped that they have derived worthy motivation from them.

After the ceremonies, the award recipient is the guest of the school, being given the opportunity to visit the shops and classrooms, and meet the student body and staff. Often this is the initial firsthand contact the winner has ever had with the school.

The recipients of the "Pioneer of Industry" Award to date are:

1943 **Edward G. Budd*, president, Budd Manufacturing Company.
1944 *Horace P. Liversidge*, president, Philadelphia Electric Company.
1945 *Walter D. Fuller*, president, Curtis Publishing Company.
1946 **Richard R. Wright*, president, Citizens and Southern Bank and Trust Company.
1947 *William J. Meinel*, president, Heintz Manufacturing Company.
1948 *William Loren Batt*, president, S.K.F. Industries.
1949 *Connie Mack*, president, Philadelphia Athletics.
1950 *William T. Innes*, publisher and printer.
1951 *Arthur C. Kauffman*, executive head, Gimbel Brothers Department Store.
1952 *Frank N. Piasecki*, chairman of board of directors, Piasecki Helicopter Corporation.
1953 *Mrs. Anna Schlorer Smith*, treasurer and chairman of the board of Mrs. Schlorer's, Incorporated.
1954 *Hubert S. Foster*, Mead Sales Company.
1955 *John B. Kelly*, builder and civic leader.

An award of this sort has the following possible values:

1. Contact with individuals from industry who have contributed to the material comfort, the service, and welfare of our society, provides an inspirational example to the student body. Students can be helped to see that vocational education has a dignity and worth that is equal to any other.
2. The preparation of the award itself is a project calling forth co-operation, and pride in workmanship among the students.
3. Newspaper and other coverage of the ceremony is one means of placing the vocational school and its work before the public.
4. The presence in the school of the award winner and other guests helps to stimulate understanding and interest in vocational education among industrial leaders.

There is one note of caution. Recognition of persons in relatively high places should not foster the implication that a high station is necessary for success in life. The faithful, dependable worker is also deserving of merit, and the school should so indicate. It can be stated, however, and that awards such as these have educational and public relations values that should be utilized more extensively.

*Deceased.

An Effective Regional Conference —

The Four State Conference

J. V. MELTON
Kansas State Teachers College
Pittsburg, Kans.

State and national conferences are a commonplace in the industrial arts and vocational education fields. Regional conferences are much less so, although several became widely known and quite influential in the first quarter of this century. A number of these, particularly of the specialized type, are still functioning. But the general regional conference, organized to interest a number of special groups, has been and still is something of a rarity.

However, the general regional conference may serve as an effective instrument to propagate ideas, improve practices, foster desirable co-operation between states, and develop morale in regions where conditions are favorable to its success. Among these conditions, those of common regional problems, general interest, leadership, and a satisfactory central facility for holding the conference are of vital importance. Inasmuch as the Four-State Conference is an example of a successfully operating general regional conference, it may be worth while to examine something of its history, organizational structure, objectives, and salient features.

The Prewar Four-State Conferences

The four-state region of Arkansas, Kansas, Missouri, and Oklahoma, with the Kansas State Teachers College of Pittsburg located near the geographical center, provides an excellent example of conditions favoring a regional conference. These conditions must have been generally recognized when representatives from the four states met in Pittsburg, Kans., in January of 1938, to discuss the organization of a conference for the region. Records indicate that the following representatives were present: R. W. Baker, William T. Bawden, A. W. Blake, Leon E. Falgren, Frank T. Fee, W. L. Friley, O. A. Hankammer, Geo. H. Hargitt, DeWitt T. Hunt, H. H. London, R. B. McHenry, Verne L. Pickens, Robert Runge, H. F. Rusch, R. L. Schwanzle, Ben D. Selfridge, and J. C. Woodin. This group provided a good representation of the leadership from the four states, and two committees were organized to develop a program for the initial conference.

The Executive Committee, to publicize the conference and arrange for

physical facilities at the College, consisted of William T. Bawden, R. L. Schwanzle, and O. A. Hankammer. The second committee, charged with planning the program, was designated the Committee on Arrangements and Program, and consisted of the following members: O. B. Badger, Tulsa, Okla.; L. E. Falgren, Kansas City, Kans.; C. B. Gatchell, Joplin, Mo.; R. B. McHenry, Fort Smith, Ark.; Verne L. Pickens, Kansas City, Mo.; J. C. Woodin, Wichita, Kans.; O. A. Hankammer, Pittsburg, Kans.; R. L. Schwanzle, Pittsburg, Kans.; and William T. Bawden, Pittsburg, Kans. These Committees scheduled the first conference for October, 1938, in Pittsburg.

The four prewar conferences of 1938, 1939, 1940, and 1941 were developed by this type of organization, with Dr. Bawden serving for the entire period as chairman of the two committees. Then, due to travel restrictions imposed by war conditions, the conference was suspended for the duration.

By the time of the third conference, 1940, the *values* of the new regional conference had become generally recognized. They were formulated by the Committee on Arrangements and Program and listed in the printed conference program for that year:

> 1) Opportunity for contacts with other teachers, and with state and national leaders. . . . 2) More comprehensive understanding of the problems of the industrial-arts teacher. 3) Opportunity to acquire new ideas on teaching methods, materials, and devices. 4) Improvement in pride, enthusiasm, and self-confidence on the part of the industrial-arts teacher. 5) Improvement of the status of industrial arts in public education. 6) Improved understanding of the place and importance of industrial arts on the part of administrators. 7) In connection with commercial exhibits, opportunity to examine tools, machines, materials, books, and other teaching aids not usually accessible to the teacher in the small community.

The prewar four-state conference, then, was basically for industrial-arts teachers, with only a token recognition of other areas and other interests. General sessions on industrial-arts questions made up the conference program. The conference was primarily a specialized one. At least five of the seven objectives were directly concerned with the improvement of the quality of industrial-arts instruction, with one directed at the development of an understanding of industrial arts on the part of administrators. The fundamental thought behind the conferences of this period was that of bringing the best possible type of programs to the industrial-arts teachers of the region, "especially . . . (for those) . . . who teach in towns of moderate size."

Four-State Conference Program-Planning Committee in session at Pittsburg, Kansas, Saturday, April 2, planning the 1955 fall conference to be held at the Kansas State Teachers College, Pittsburg, on Friday and Saturday October 21–22.

Seated at the rear center of the table is Chairman M. J. Ruley of Tulsa, Okla. To Mr. Ruley's right and forward are: Jack Morgan and O. A. Hankammer, Pittsburg, Kans., Doyle Kemper, Springfield, Mo.; Otis Farrar, Little Rock, Ark., T. and I. Program Chairman; J. Kelly Mudd, Stillwater, Okla., General Sessions Program Chairman; Lee M. Eosman, Pittsburg, Kans., Exhibits Chairman; and M. J. Packard, Conway, Ark. Back left and forward are O. H. Beatty, Topeka, Kans.; and Armin F. Gimbel, Springfield, Mo. To Mr. Ruley's left and forward are: W. L. Hammock and J. W. Barnes, Tulsa, Okla.; J. V. Melton, Pittsburg, Kans.; Gordon O. Johnson, Jefferson City, Mo.; Industrial Arts Program Chairman; Virgil Huston, Bartlesville, Okla.; O. R. Kisner, Tulsa, Okla.; and H. D. Shotwell, Topeka, Kans., Part-Time Co-operative and Business Education Program Chairman.

The Postwar Four-State Conferences

The fifth regional conference, the first postwar conference, was organized in 1947 under the direction of the late W. L. Friley of the Kansas State Teachers College, in response to a general demand to resume the conference. Attendance that year of approximately 400 gave an indication of the interest in its continuation.

In 1947, the common "general sessions, sectional meetings" program framework or pattern was initiated, and trade and industrial education added. A sectional meeting for those interested in the veterans training program was operated from 1947 to 1952. Co-operative part-time and business education programs were added in 1948; and in 1950, a special sectional meeting for printers in the region appeared. Attendance at the 1950 four-state conference was the largest of any similar event ever held on the Kansas State Teachers College campus.

Although the base of the postwar conferences was thus broadened, the fundamental objectives of 1940, with necessary modifications, have been consistently followed. In 1949, these objectives were revised in terms of the new conditions, and the revised list indicates clearly the postwar trend of the conference:

> 1) Opportunity for contacts with other teachers, supervisors, and with state and national leaders. . . . 2) More comprehensive understanding of the problems of the teachers of industrial arts and of vocational education. . . . 3) Opportunity to acquire new ideas on teaching procedures, course organization, materials, and aids. 4) Desire to assist in improving the status of industrial education, in all of its forms, in our public school program. 5) Clearer understanding of the place and importance of industrial education on the part of school administrators, and of the relations between the various types of industrial education. 6) Exchange of ideas on developments within the region. 7) Increase in the pride, self-confidence, and enthusiasm of all who labor in the industrial education field. 8) Personal professional growth for those who participate in the conference, either through appearance on the program or through discussion. 9) Opportunity to examine tools, machines, materials, books, and teaching aids not usually accessible, through the medium of the Commercial Exhibit.

During the war years, the organizational structure of the conference had fallen apart. Accordingly, one of the important postwar problems was the reestablishment of some type of workable association that would invite the continued full and free representation of the states and the new areas of interest. The first two or three conferences were

developed by temporary, annually invited, program planning committees. During this time, the advisability of a policy or steering committee was thoroughly discussed. The upshot of these deliberations was the eventual development of a Steering Committee composed of two to three representatives from the four states, charged with the over-all operation of the conference. This Committee now meets annually at the time of the conference. It sets the date and place of the next conference, conducts research on appropriate conference questions, discusses various problems and makes decisions in connection with the operation of the conference, and issues invitations to the spring Program-Planning Committee meetings. The Steering Committee has developed into a rather permanent and formal committee; while the Program-Planning Committee, which it appoints, is organized annually and is flexible and informal. The functions of these Committees resemble, roughly, those of the prewar period.

In 1952, Doyle Kemper, head of the department of industrial education of the Southwest Missouri State College, Springfield, Mo., became the first chairman of the new Steering Committee. He served for two years, giving a strong impetus to the growth of the conference. He was succeeded by M. J. Ruley, director of Industrial Arts and Vocational Education, Tulsa public schools, who is now serving his second term. Some of the other members of the present Steering Committee include: Otis Farrar, Ark.; O. H. Beaty, Kans.; Doyle Kemper, Mo.; O. A. Hankammer, Kans.; G. O. Johnson, Mo.; E. W. Packard, Ark.; G. H. Oheim, Mo.; J. Kelly Mudd, Okla.; and H. D. Shotwell, Kans.

Chairmanship of the conference steering committee is rotated among the four states. The chairman of this committee also serves as chairman of the program-planning committee. The latter committee, in line with the traditional objectives of the conference, gives special emphasis to teacher representation and participation in the building of conference programs. No opportunity is overlooked to involve as many capable shop instructors as possible in the annual planning sessions, the conference programs, and in other aspects of the work of the conference.

This is the year of the thirteenth Four-State Conference. On April 2, the Program-Planning Committee selected the theme, "The Forward Look in Education" as suitable for the development of this year's October 21–22 conference program. This theme also accurately characterizes the thirteen-year record of growth of a unique experiment in regional industrial arts and vocational education conferences.

BURMESE EDUCATORS VISIT THE STATE UNIVERSITY OF NEW YORK

Miss Daw Tin Saw Mu and Miss Daw Thein Nyunt, lecturers at the University of Rangoon in Burma, accompanied by Mr. Maung Mai Aung, a graduate student at the State University of New York College of Forestry in Syracuse, spent Saturday, October 23, 1954, on the Campus of the State University Teachers College at Oswego.

The educators were the guests of Mr. Maung Maung Gyi, a fellow countryman, who is a senior in the industrial-arts division of the college.

While on the campus, the visitors conferred with Dr. Norman E. Whitten, Dean of Students, on the policies and programs of the Student Personnel Office, and toured the Campus.

In their tour, the visitors showed keen interest in the industrial-arts program, building, and equipment, and in the student dormitories and residence halls.

After being served lunch in the College Cafeteria, the educators visited Old Fort Ontario, one of New York State's most famous historical monuments, and watched the Greek Games, the annual interfraternity and sorority athletic festival at the College.

Miss Daw Tin Saw Mu is the sister of the rector of the University of Rangoon, and Miss Daw Thein Nyunt is the directoress of INYA Hall, a women's dormitory at the university. Both are guests of the United States Government under the Fulbright Program.

Burmese visitors watching John Hays, an industrial-arts student at State University Teachers College, Oswego, N. Y., at the loom. From left, Mr. Maung Maung Gyi, Miss Daw Thein Nyunt, Mr. Maung Mai Aung, Miss Daw Tin Saw Mu, and Dean Whitten

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The motion-picture industry relies on such versatile performers as petroleum-based polyesters, resins, and solvents to play an important "behind-the-scenes" role in bringing the American public such spectacular innovations in film-making as Cinerama, the wide screen, sound-motion-picture process, and Cinemascope. These oil products are used as the base materials and coatings in the manufacture of magnetic films and magnetic recording tapes used for motion picture sound systems. Discovering the magical properties of oil and new ways of putting them to use is a constant challenge to the progressive people of the oil industry. — *Petroleum Newsnotes.*

We must have machines that will reduce the muscle content in factories, on the farms, in the mining, steel, and construction industries. And we must find the men and women capable of designing, manufacturing, and operating as well as servicing these more complicated machines.

This means simply one thing — we need a higher level of education. — *Dr. Baker, General Electric Company.*

The typical optometrist's bill has gone up from $25 to $33 since 1940 while the average factory employee's wage has gone up from $25 to $71 a week, according to the American Optometric Association.

Industrial Arts and Vocational Education

JOHN J. METZ, Editor

DRIVER, SHOP, AND GENERAL SAFETY

It is quite satisfying to note that driver education is receiving increasingly more attention in the educational courses of our high schools. According to a release received from the Association of Casualty and Surety Companies, ten states, led by Minnesota, have been selected to receive the nation's top awards for the extent and quality of their driver education programs conducted during the 1954–55 school year. The selections were made by 12 educational and traffic safety leaders comprising the board of judges.

Minnesota and Massachusetts received the top-ranking awards for excellence. Special awards were given to Connecticut, Kansas, New Mexico, and Ohio. Special progress awards were recommended for the public schools of Colorado, Mississippi, Montana, and Washington. Special citations for driver education were recommended for the driver education offered in the private and parochial schools in Delaware, New Hampshire, North Dakota, Oklahoma, and Vermont.

Schools can do much in helping to cut down the automobile accident toll that gives our country such a bad reputation, and causes so much suffering and the loss of so many lives. The need for these courses is great. Automobiles caused 35,500 deaths and 1,960,000 injuries in 1954.

The Travelers Insurance Company, in their little book, "Misguided Missiles," say that week-end crashes accounted for 13,980 killed and 678,000 injured. They also report that 39 per cent of the deaths and 35 per cent of the injuries occurred on Saturdays and Sundays last year. Furthermore, they state that excessive speed was the most dangerous driving mistake again in 1954, killing 12,380 persons. Drivers under 25 years of age were involved in more than 24 per cent of 1954's fatal accidents although they constitute only about 14 per cent of the total of all drivers.

It is time that something be done to improve this dreadful record, and we, the shop teachers of America have it within our power to help our students learn how to drive safely.

While we are thinking of safe driving courses, we must not forget that every effort must be made to help our students to acquire safety habits in everything they do. It is true — the worker in a shop may have an environment that requires a special type of carefulness. He may be working with tools and machines that require a specific concern in guarding against injuring himself and others.

Each shop teacher knows that he must instruct his students in the *how and why* of using tools and machines in a certain way at all times. Taking chances is not *brave* or *smart;* it is really *kid stuff*. Make them realize this, and you are doing your share in making your community safe.

DECIMAL DIMENSIONING

In most industrial drafting rooms, the scales used are still the full size, half size, quarter size, and eighth size. There are some branches of industry, however, that have introduced scales with decimal dimensioning, some as far back as 25 years ago. Among these are the automotive and the aeronautical industries.

Charles M. Wright, standards engineer of the Chrysler Corporation, and a member of a number of committees of the American Standards Association, wrote a very worth-while and understandable article entitled "The Case for Decimal Dimensioning," which appeared in the August, 1955, issue of the *Magazine of Standards*, published by the American Standards Association, Inc., 70 East 45 St., New York 17, N. Y.

In this article Mr. Wright points out that the decimal system, once adopted, would save much time because the addition of a series of fractional dimensions takes about five times as long as it would to add a similar series of decimals.

It would also obviate the adoption of the metric system, the only advantage of which is that its units are all multiples of ten, and for that reason would do all that the decimal system would do for us. The people who hold this viewpoint seem to forget that the metric system involves a different unit of measurement than our inch, and its adoption would therefore cause a great deal of trouble before the men in the shop had been fully instructed in its use.

For fear that someone would be troubled about the number of decimal places that would be used if this dimensioning scheme were generally adopted, it is hoped that for most engineering drawing it could be limited to two-, three-, or four-place decimals. It would of course be understood that tolerances would not be implied by the fact that decimal dimensions are used.

While this decimal dimensioning is in use for 25 years or more, it is still far from common and for that reason it would be a good thing to explain it to the students now taking drafting. It would help them adapt themselves a little quicker if, perchance, their first drafting experience should be gained in the drafting room where the decimal dimension had been adopted.

A set of standard scales is now being worked out for industry by the American Standards Association.

THEN AND NOW

An interesting bit of history is published in the August, 1955, issue of the *Magazine of Standards*.

James Watt (1736–1819) spent ten years trying to keep the steam from leaking past the piston in his condensing steam engine. There was no trouble in turning the piston truly round, but boring the inside of the steam cylinder was quite another matter.

Cylinders at that time could be cast with interiors only approximately round. The roughness of the inside surfaces then were smoothed down with water and sand and the expenditure of a lot of elbow grease. This procedure was the extent of "boring" out the cylinder.

In the little sketch published in the *Magazine of Standards* mentioned in the foregoing, it states that one of Watt's cylinders with an inside diameter of approximately 18 inches, was so much out of round, that "at the worst place the long diameter exceeded the short by three eighths of an inch."

To make the piston fit in such a cylinder, Watt "wrapped it around with cork, oiled rags, tow, old hats, paper, and other things, but still there were open spaces left sufficient to let the air in and the steam out."

If Watt could only come back and see some of our boring mills and boring bars. Wouldn't he be delighted with our measuring devices. What would he say if he saw a good mechanic use a set of Johansen blocks to inspect the accuracy of a piece of work down to less than a quarter tenth of a thousandth.

Problems and Projects

SHOP AND ART PROJECTS

ARTHUR and MARGARET REA
High School
Caro, Mich.

When a senior woodshop student, with an eye to the future, began building living-room furniture, he consulted his current flame, an art major, concerning selection of plan, size, and finish. The two handsome

Fig. 2. A ceramic lamp

Fig. 1. Functional contemporary furniture

and functional pieces shown in Figure 1 were the results. Thus began an interesting and mutually helpful collaboration between the shop and the art room.

The ceramic lamp, Figure 2, was made in the art room but it was taken to the shop for wiring and fixtures. A handsome walnut salad bowl, carved by a shop student, was influenced as to proportions and

Fig. 4. Wire bowl

Fig. 3. Wrought iron snack table

shape by the art teacher. A wrought iron snack table, Figure 3, was made in the shop and received a decorative ceramic tile top in the art room. The wire bowl, Figure 4, began as a line drawing.

At first this correlation was a spur-of-the-moment thing. Now the student regularly works in both areas. When he plans a project, the student indicates the number of processes that he expects to carry out in shop, and those which will require the art facilities. This enables the art teacher and shop teacher to schedule times for him to work which will be convenient for both. With a little care, this will balance out so that neither department is overburdened. This system also offers the added advantage of permitting a student to sample two fields of endeavor, while he may be able to actually schedule only one course.

We find that the students gain in creative ability and sense of design through working in the arts, while technical skills, use of tools, and higher standards of workmanship are developed by the shop. This

results in an enriched experience and a useful and beautiful article in which the student can find real satisfaction.

A blind approach to a one-way bridge near the Army's Camp Truscott in Salzburg, Austria, gave rise to a little American ingenuity which means a saving of $2,100 to the American taxpayer. Soldiers rigged a makeshift traffic light of salvaged telephone poles and wire, scrap lumber and used lights. The job was done as part of on-the-job training for the 258th Signal Construction Company. — *Information Section, Wisconsin Military District.*

LEATHER CARVER'S STRIKING STICK

RAYMOND B. COLE
Crafts Instructor
High School
El Monte, Calif.

Frequently leathercraft students on the secondary level obtain a degree of skill that makes them desire a set of their own tools so that they may carry on their work at home. A necessary part of a set of tools is a striking stick which can be made by the student.

The leather carver's striking stick in use

Procedure

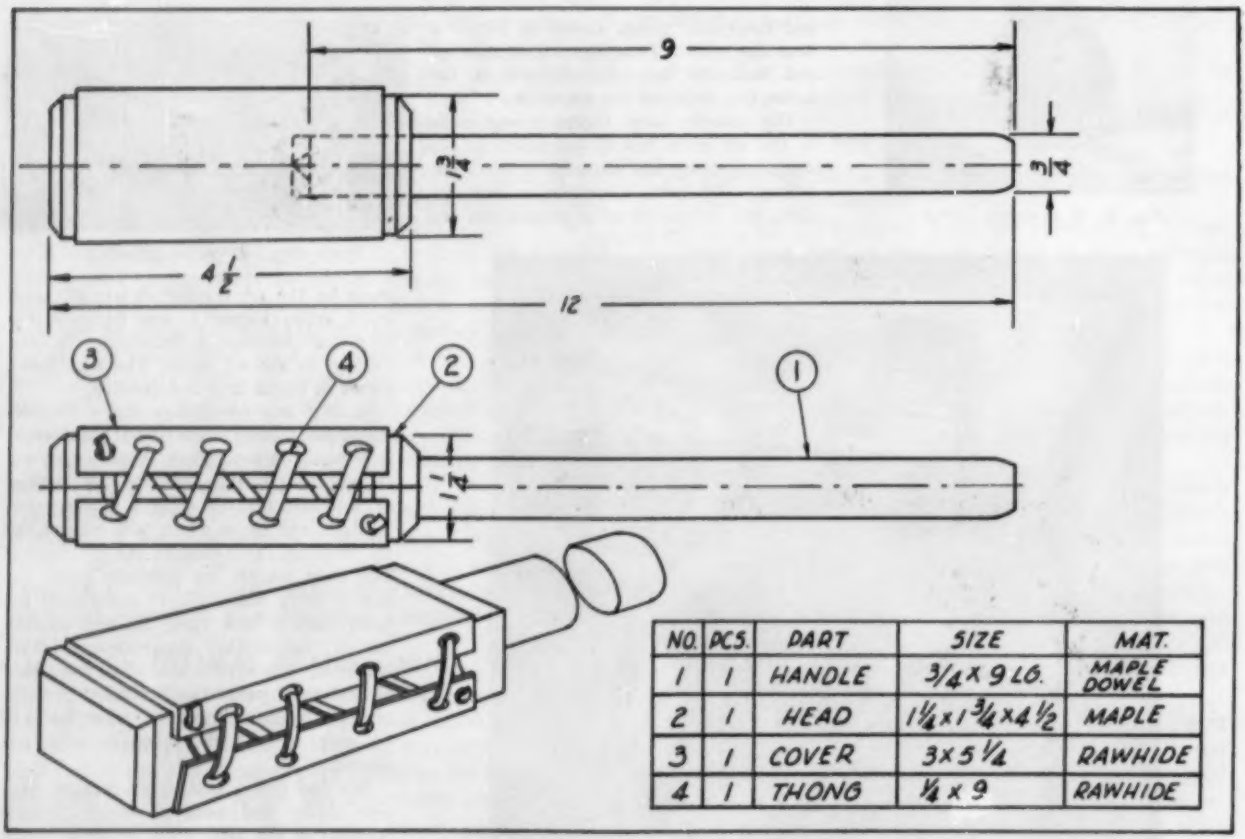
1. Cut parts to size.
2. Bevel ends of head.
3. Round one end of handle.
4. Drill hole for handle.
5. Sand head and handle.
6. Glue head to handle.
7. Shellac.
8. Soak rawhide cover and thong in water (overnight).
9. Punch holes for thong.
10. Lace rawhide cover to head.
11. Allow to dry thoroughly.

BOOK AND LETTER RACK

MERRILL CHANEY
Woodwork Instructor
Northeastern Oklahoma A. & M. College
Miami, Okla.

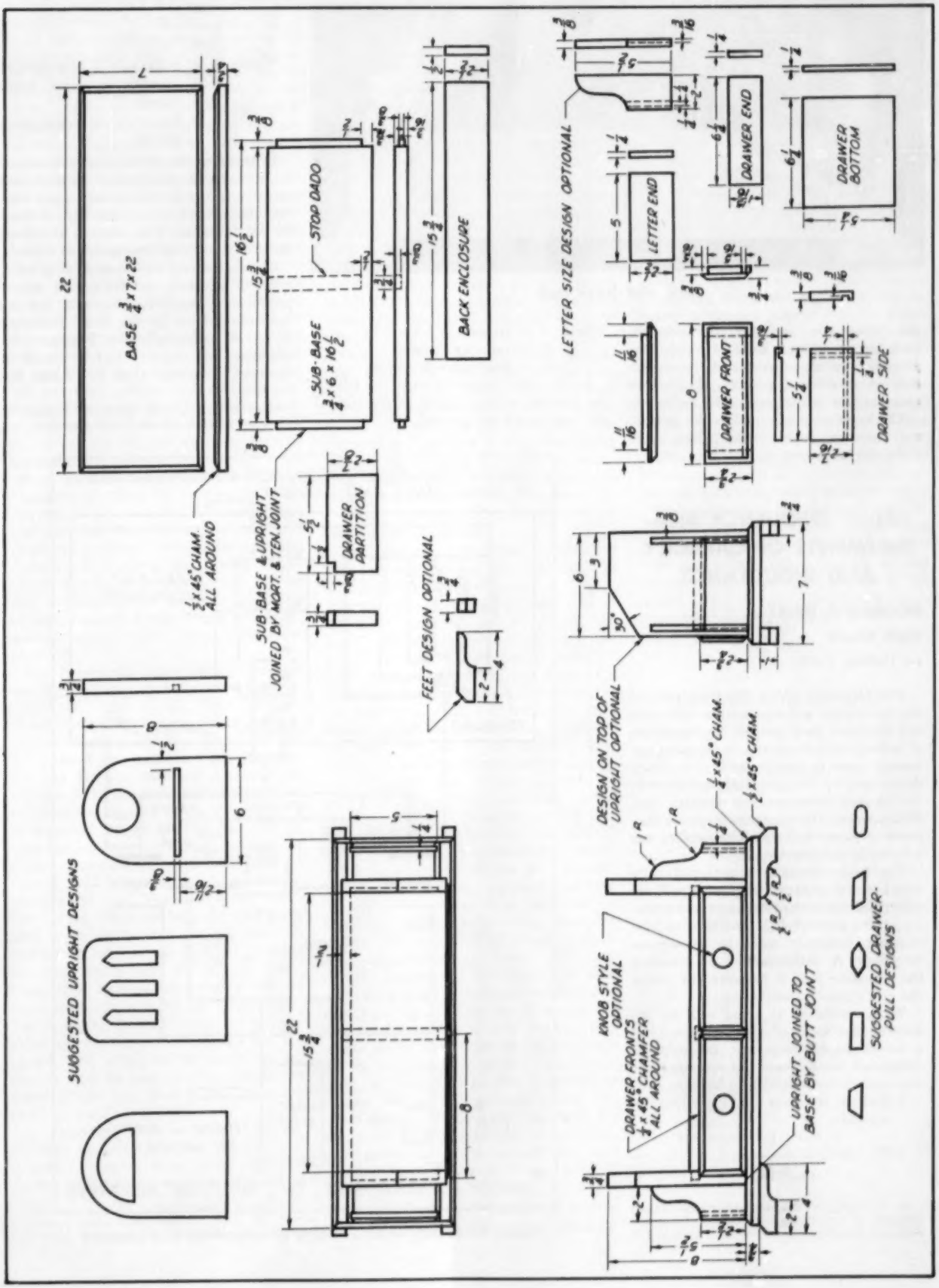
The letter-book rack combination, shown and described herewith, has proved to be a beginning project for the writer's junior college woodworking class.

There are many possibilities in this project. For instance, I let the students select their own design on the ends, sides, feet, pulls, but do require them to conform to the over-all dimensions. In making

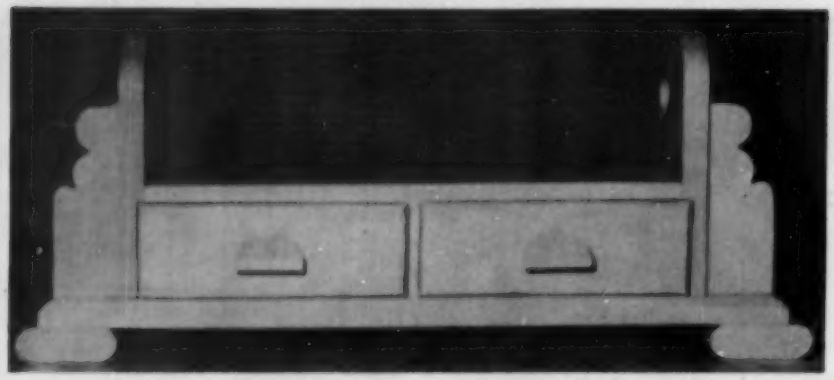


NO.	PCS.	PART	SIZE	MAT.
1	1	HANDLE	3/4 x 9 LG.	MAPLE DOWEL
2	1	HEAD	1 1/4 x 1 3/4 x 4 1/2	MAPLE
3	1	COVER	3 x 5 1/4	RAWHIDE
4	1	THONG	1/4 x 9	RAWHIDE

Detailed drawing and list of materials for a leather carver's striking stick


BASE ¾ x 7 x 22
STOP DADO
SUB-BASE ¾ x 6 x 16½
BACK ENCLOSURE
¼ x 45° CHAM. ALL AROUND
SUB-BASE & UPRIGHT JOINED BY MORT. & TEN. JOINT
DRAWER PARTITION
FEET DESIGN OPTIONAL
LETTER SIZE DESIGN OPTIONAL
LETTER END
DRAWER END
DRAWER BOTTOM
DRAWER FRONT
DRAWER SIDE
DESIGN ON TOP OF UPRIGHT OPTIONAL
¼ x 45° CHAM.
KNOB STYLE OPTIONAL
DRAWER FRONTS ¼ x 45° CHAMFER ALL AROUND
UPRIGHT JOINED TO BASE BY BUTT JOINT
SUGGESTED UPRIGHT DESIGNS
SUGGESTED DRAWER-PULL DESIGNS

Details of the book and letter rack by Merrill Chaney



Book and letter rack

the drawer sides we make each side and back out of different kinds of wood. This gives the student some idea of the characteristics of different material. Many other ideas may be introduced by the instructor.

The types of joints used in this project are: mortise, tenon (blind), butt, stop dado, use of screws on butt joint, etc.

RADIO FREQUENCY MEASUREMENTS OF CAPACITY AND INDUCTANCE

NORMAN R. DILLEY
High School
La Habra, Calif.

The following circuit has been devised for the amateur and experimenter and radio and electronic shop teacher. Measurements of inductance and capacity in the radio frequency range is possible with an accuracy determined by the calibration accuracy of the standard condensers and standard coils. Measurements of capacitance and inductance at power and audio frequencies was covered in an earlier article.[1]

The basic circuit is a push-pull plate tuned crystal oscillator. Oscillation will not take place unless the inductance and capacity in the plate circuit tune to a parallel resonant frequency equal to the crystal frequency. A sharp method of obtaining the resonance peak is permitted by noting the grid current at oscillation.

When oscillation is noted with an unknown inductance and a known capacity at a known crystal frequency, the value of inductance can be found. At resonance one can assume the following to be true.

Inductive reactance = capacitive reactance

Then, $2\pi fL = \frac{1}{2\pi fC}$ or $L = \frac{1}{(2\pi f)^2 C}$

Where, f = frequency in cycles
C = capacity in farads
L = inductance in henries

In the radio frequency range the following formula is more suited to the size of the components encountered.

$$L = \frac{10^6}{39.48\, f^2 C}$$

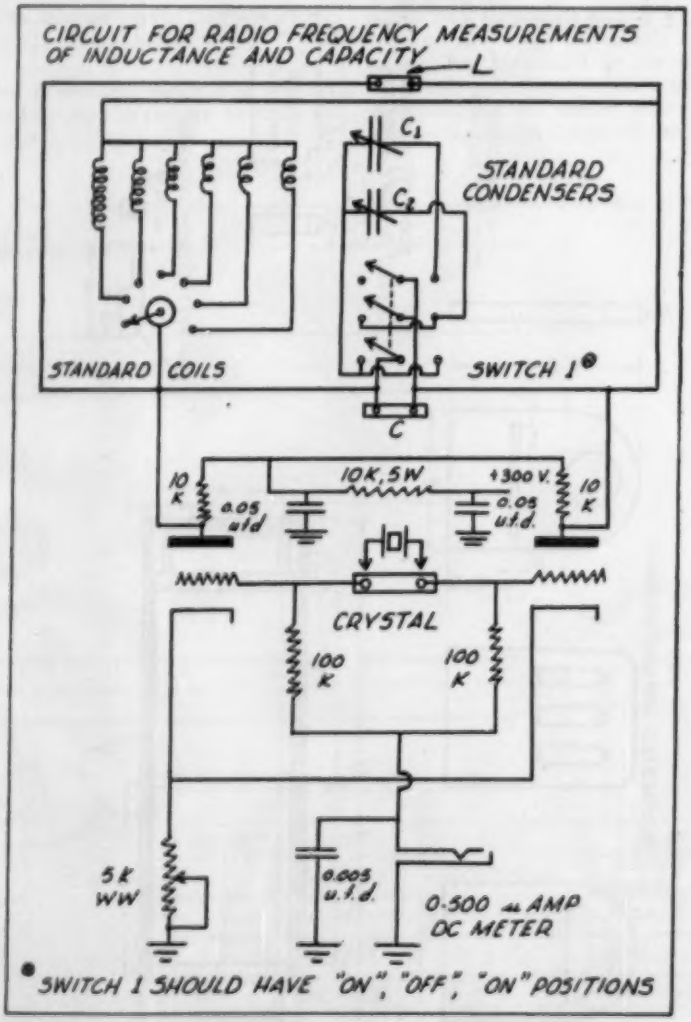
Where, L = inductance in microhenries
C = capacity in micro micro farads
f = frequency in megacycles/second

In other words, inductance is measured by a capacity substitution method and capacity is measured by an inductance substitution method with appropriate rewriting of the formulae. This requires standards and a crystal or an assortment of crystals.

Calculation may be dispensed with (with reduced accuracy) by the use of nomographs or a reactance slide rule like the one once put out by the Shure Brothers.[2] A set of nomographs for frequency, inductance, and capacity can be found in the book *Reference Data For Radio En-*

[1] N. R. Dilley, "Measuring Impedance Without Standards of Capacity and Inductance," Industrial Arts and Vocational Education, Apr. 1954, p. 150.

[2] Shure Brothers, 225 W. Huron St., Chicago, Ill. (It is not known if the rule is still available.)



Radio frequency measurements of inductance and capacity

gineers[3] along with a host of other data useful to the radio teacher.

In the practical problem of getting set up one may find calibrated fixed condensers in the surplus TU-5B tuning unit of the BC-191 transmitter (once used in the B-24). As far as the variable standards of capacity, one solution is to secure a couple of the GP-7 Aircraft Radio surplus tuning units. These contain a good linear (with capacity) condenser in the range of 20-180 uuf when mounted against a metal panel. This same tuning unit contains a variable inductance which must be calibrated to measure capacitance in the same circuit that is being discussed for inductance measurements. Two condensers of above description, plus a fixed condenser of 100 uuf, will give a maximum of 420 uuf for measurements. It might be noted that it is easier to find two smaller condensers of good linearity (with capacity) over the 180 degrees of rotation than one larger condenser. The reason why the variable standards should be linear in capacity is that if this is so then the dial divisions may be marked out in a linear fashion, with 1 uuf taking the same number of dial divisions regardless of where the rotation has been stopped. With the GP-7 condenser there are 800 dial divisions in the calibrated range which allows 1 uuf to take up 5 dial divisions. This allows easy reading of capacity directly from the number on the dial, a feature which speeds up operation of the procedure. Linear condensers in regards to capacity have a semicircular rotor plate.

The twin triode tubes that can be used are the medium mu tubes as the 6SN7, 6J6, 12AU7, and 12AT7. Only one tube socket was indicated on the circuit diagram, but one should mount the three types, the octal, the 6 pin, and the 9 pin (the last two are for the miniature tubes). This allows a choice of tubes and further permits the insertion capacity of the tube used to be measured. In practice one does this by inserting one tube and tuning the variable capacity standard (with an inductance attached) until the resonant grid current maximum is noted. The value of the capacity is noted. Then another tube (it doesn't need to be the same type) is inserted in another socket and the capacity lowered somewhat for a new grid current maximum. The decrease of capacity will be the insertion capacity of the second tube. The first tube should be removed and the value of the insertion capacity of the second tube added to the condenser indicated value for best accuracy. The writer found this to vary from 1 uuf for a 6J6 to about 7 uuf for a 6SN7.

A precaution must be noted with the standard variable condenser. It will have a certain value of capacity even though the dial indicates zero rotation. When it is used in parallel with another condenser the zero dial setting does not mean that one adds zero capacity. The capacity of the two condensers (or one if only one is used) must be measured and taken into account during operation. The GP-7 condensers have about 20 uuf capacity when their dial indicates zero rotation.

The oscillator circuit has no particular upper or lower limit as to frequency of operation. Naturally with the lower frequency crystals the 10,000 ohm plate load resistors may not be large enough to excite a sluggish crystal. If one plans to operate down around 500 kcs it would be advisable to double or triple the present plate load resistor value. As for changes in the grid leak resistor value, it has been found that the 100 K is a good all-round value.

One should arrange to secure crystals from around 500 kcs and up keeping each crystal about 1mc different (higher) than the other. Overtone crystals will work also in this circuit. It should be recalled that a crystal may oscillate at other frequencies than its fundamental. Until the characteristics of a particular crystal are known one should use a radio receiver to check the frequency when oscillation is noted by the grid current maximum.

The unknowns are plugged across the variable condenser, or the inductance in the laboratory jacks provided.

Sockets for crystals should take care of the 0.125″ pin and 0.500″ spacing, the 0.095″ pin and 0.500″ spacing, and the 0.157″ pin and 0.750″ spacing types. A good quality octal socket will serve as a holder for the first, a five hole tube socket for the second, and the laboratory twin banana plug jack will serve as holder for the last. One should try different tube sockets as some have better dimensions as crystal holders than others. It should be mentioned that crystals calibrated on the hundreds will save time in calculations.

The variable resistance in the cathode to ground lead allows one to make a setting there that will make the two plate voltages about equal (each tube will have a different setting). This allows best operation of the tube. While the frequency does not change, the circuit will, if driven to maximum grid current, allow one triode unit to take over in the oscillation. The tube will be under poor operating conditions in regard to tube life. One should operate the tube at the value of grid current that allows one to measure about equal voltages at the inductance or capacity laboratory jacks. If more grid current is needed to operate the available current meter, two tubes may be used. When searching for the point of oscillation one should have zero resistance in the cathode lead and increase it when the oscillation point is found.

Since B plus is on the panel jacks reasonable care should be taken when attaching the unknowns — plugging them into the jack with an insulated twin banana plug whose leads are clipped to the unknown first. Insulated knobs must be on the condensers if no insulated coupling is used, and the variable standard condensers must be insulated from the front metal panel of the constructed unit.

The circuit has other possibilities for measurement of Q and equivalent series resistance of the parallel resonant circuit. This is being investigated at present.

The coils shown in the circuit are a set of coils from the antenna stage of a communication receiver that had several bands. These allow a preliminary resonant point to be found with a new crystal. Then this is switched out of the circuit and the unknown inductance plugged into the proper jack. While they are not strictly necessary (calibrated variable inductances would do) they allow quick changes of inductance when one is testing a new crystal. These fixed inductances should be calibrated and can be used to measure capacity when used with the variable condensers.

If one has available the coils from the BC-348 army receiver the writer can furnish the inductance values upon request.

The operation of the circuit is quite instructive and allows one to measure the tank circuit resonant frequency of amateur radio transmitters. This is done by plugging the tank into the grid jack in place of the crystal. Next resonate the circuit — calculate the frequency from the plate circuit values.

[3] *Reference Data For Radio Engineers*, Federal Telephone and Radio Corporation, 67 Broad St., New York 4, N. Y., pp. 44-46. This is the 1943 edition.

ALUMINUM TIE CLIP

EARL G. TYLER
High School
Bayport, L. I., N. Y.

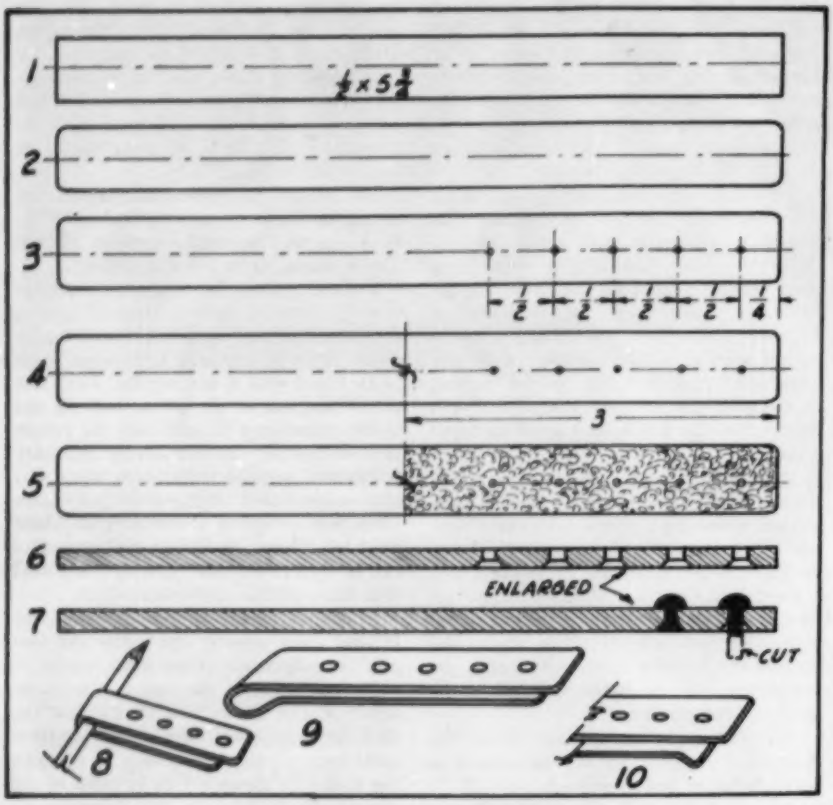
This particular project offers many operational experiences to a new student such as: getting out stock, cutting with tin snips or squaring shears, laying out, filing, center punching and drilling, countersinking, drill press operation, peening, riveting, buffing, and finishing.

MATERIALS

No. of Pieces	*Name*	*Size*
1	14-ga. aluminum, or metal of your choice	½ by 5¾ in.
5	R.h. rivets	⅛ dia. by ¼ in. long
	Chasing hammer	
	Center punch	
	Countersink	
	Smooth file	
	Steel wool	No. 3/0

Procedure

1. Locate center line on piece of stock with a pencil, Figure 1.



Details of the aluminum tie clip

2. With a smooth file, file a 1/16-in. radius on each corner for appearance, Figure 2.

3. Locate holes for five rivets and center-punch holes, Figure 3. Locate holes accurately and in perfect alignment of rivets.

4. With a pencil measure off 3 in. for the bend line.

5. Peen entire area of the 3-in. section with a polished chasing hammer, Figure 5.

6. Drill 1/8-in. holes for rivets and countersink on the reverse side to the depth of approximately 1/32 in., Figure 6.

7. Insert rivets, one at a time, in each hole and with a pair of diagonal cutting pliers, remove all rivet material protruding through the back. This leaves the correct amount of rivet for peening into countersunk hole. Go on to the next rivet and when all are in place, file smooth and flush on reverse side, as in the drawing. Place the head of the rivet on a block of basswood or pine during the riveting process instead of a rivet set so as not to mar the surface. Work on the end grain for best results.

8. Dress down reverse side after filing with fine steel wool, Figure 7. All surfaces and edges are to be steel wooled.

9. The folding or forming operation is not difficult. Use a 16*d* nail, and fold the tie clip around the nail on the fold line, Figure 8. Sight the edges for straightness. Leave the nail in place and with a plastic faced, rawhide, or wood mallet, strike a blow near the nail on the reverse side. This will give the tie clip proper tension.

10. Remove nail and with a pair of needle nose pliers, bend the short end of the tie clip down for ease in placing on the tie, Figures 8 and 9.

11. The final finish is a matter of individual student taste. The project may be given a satin finish with steel wool or buffed to a high polish on a buffer with extreme care being given to the heads of the rivets so as not to wear down the heads.

This project has been tested in seventh-, eighth-, and ninth-grade classes with good success. It has evoked good workmanship and most of all, keen interest. Parent comments when received as a gift, were highly favorable.

TIN CAN BASE FOR THE CHRISTMAS TREE

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Every year industrial-arts teachers are confronted with the problem of stands for the classroom Christmas tree. Then too, pupils like to make tree stands that can be used at home, for frequently last year's stand was not satisfactory, or has disappeared. Stands that hold water are becoming more and more popular. The stands shown here are heavy enough to be stable, hold enough water to last several days before a refill is needed, and while decorative enough, lend themselves to covering with decorative paper, cloth, or aluminum foils.

Three stands are shown in Figure 1. The large one in the center is made from a white lead can, with a 4-in. iron pipe set in concrete. It weighs fifty pounds or more when completed, and will hold a full gallon of water when in use. It is very satisfactory where a large tree is desired, but is too heavy for general use. The stand on the left of the picture is made from a gallon size can. It weighs ten to twelve

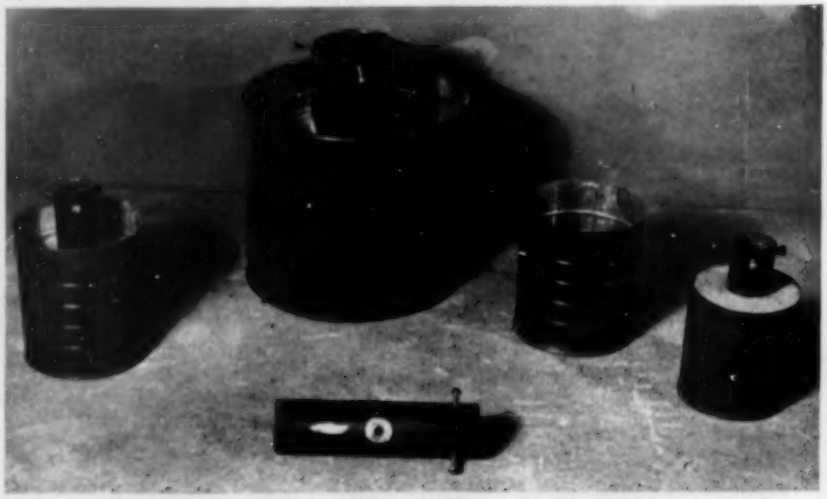


Fig. 1. Christmas tree stands

pounds without water, of which it holds one quart. The stand on the right is made in two units. Part one, which is filled with concrete, is made from a half gallon can. Part two is simply an empty gallon can that houses the first unit. This stand, when assembled, holds almost two quarts of water, and weighs eight to ten pounds.

We have made these types of tree stands in our school for the past two years. They have proved their worth. They are practical, give the boy a chance to do some very simple work in concrete with little mess, and do not require the making or maintaining of forms. The construction is simple; few tools are needed; very little expense is involved; and the job is within the ability of the seventh- and eighth-grade pupil.

We store a supply of thoroughly clean, dry cans which we have been collecting. We use discarded, or secondhand, iron pipe for the support. One and one-half in. and 2-in. pipe is very satisfactory for tree sizes. The pipes are cut with a hack saw. They must be long enough to project above the top of the can and allow space for tightening the screws that hold the tree secure. For the gallon size we cut the pipe to 9-in. lengths, file the ends square, and drill three equally spaced 7/32-in. holes at a distance of 1 in. from the top. These holes are tapped out with a ¼ No. 20 tap to take a ¼-in., round head, stove bolt. A ⅜-in. hole is also drilled 4¼ in. from the top. This hole allows the water to feed into the tree. This hole is shown in the view of the support, or pipe piece. It is in the center of the chalked circle. A couple of similar holes may be drilled above it to make water absorption faster.

The lower section of the pipe may be filed flat in several spots, or setscrews may be added to give better anchorage of the pipe in the concrete. The pipe is held in place, with a 1-in. clearance at the bottom, by concrete (one part cement to two parts sand, and not too wet). Tamp the moist concrete around the pipe from the base up to the drain hole. Allow to dry slowly. Within five or six days the job may be cleaned and painted. We paint the inside section with linseed oil and dryer, and the outside with a good enamel, usually dark green.

When the paint is dry the stand is ready to use. Place the tree in the support, tighten the screws to hold the tree straight, and fill with water.

The stand at the right has no drain hole in it. The center section of the can bottom is cut out after the concrete hardens, allowing the water to enter from the bottom when it is placed in the other can. The outside can may be discarded, to be replaced next year with a new one.

These stands keep the tree fresh, hold it securely in place, can be quickly set up by a child, and with a little care will last for a long time.

A HAND-CARVED SERVING TRAY

FRANKLIN H. GOTTSHALL
Boyertown, Pa.

Every family needs serving trays around the house, and at least one of them should be of sufficiently fine quality to be used only for those occasions when the best is hardly good enough. A hand-carved tray, such as the one shown here, meets these requirements, and it will also be a nice display piece to dress up the side board, or to be used as a base upon which to place a nice flower arrangement.

The tray shown here was carved of oak, a material well suited to the rather provincial type of grapevine motif chosen for this particular design.

To make the tray itself is a simple matter. Molding like that shown in Figure 4, may be readily shaped with hand tools like a spokeshave, or a plane, after the rabbet into which the tray bottom is later fitted, has first been cut on the circular saw. After the molding has been formed to its proper shape, the corners are mitered in a miter box. The frame is then glued and nailed together, as shown in Figure 5. If small holes are drilled for the brads, the wood will not be split when the joints are nailed. Fasten one piece of the frame in a woodworker's vise to nail the next piece to it.

The tray bottom should be made of plywood, since plywood will neither swell nor shrink appreciably as would solid wood. A good grade of plywood, surfaced with gum, birch, or some other hardwood, should be used, rather than just ordinary fir plywood, the grain markings of which would compete with the carving on the frame for attention, a thing to be avoided if possible.

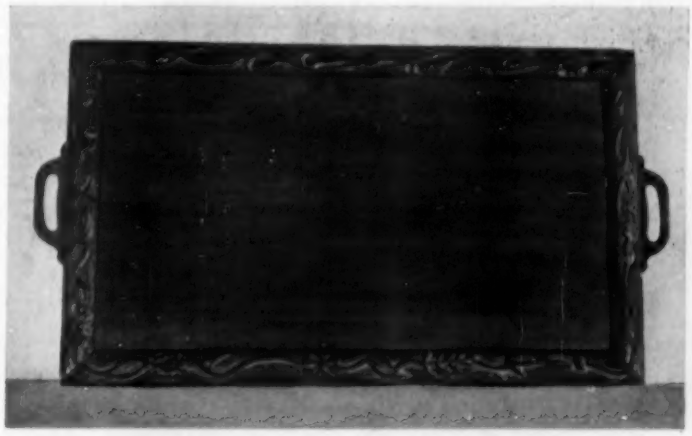


Fig. 2. Hand-carved serving tray

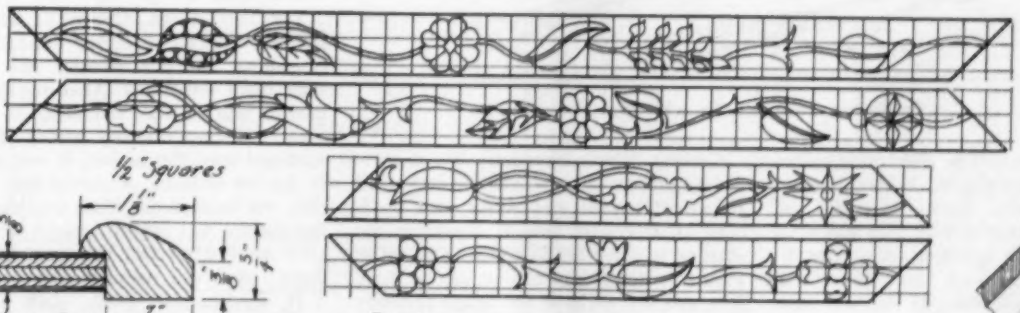


FIG. 3 Patterns To Lay Out The Design

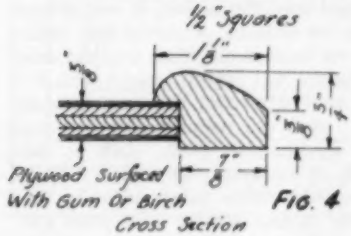


FIG. 4 Cross Section

FIG. 5 Miter Joints Are Glued & Nailed

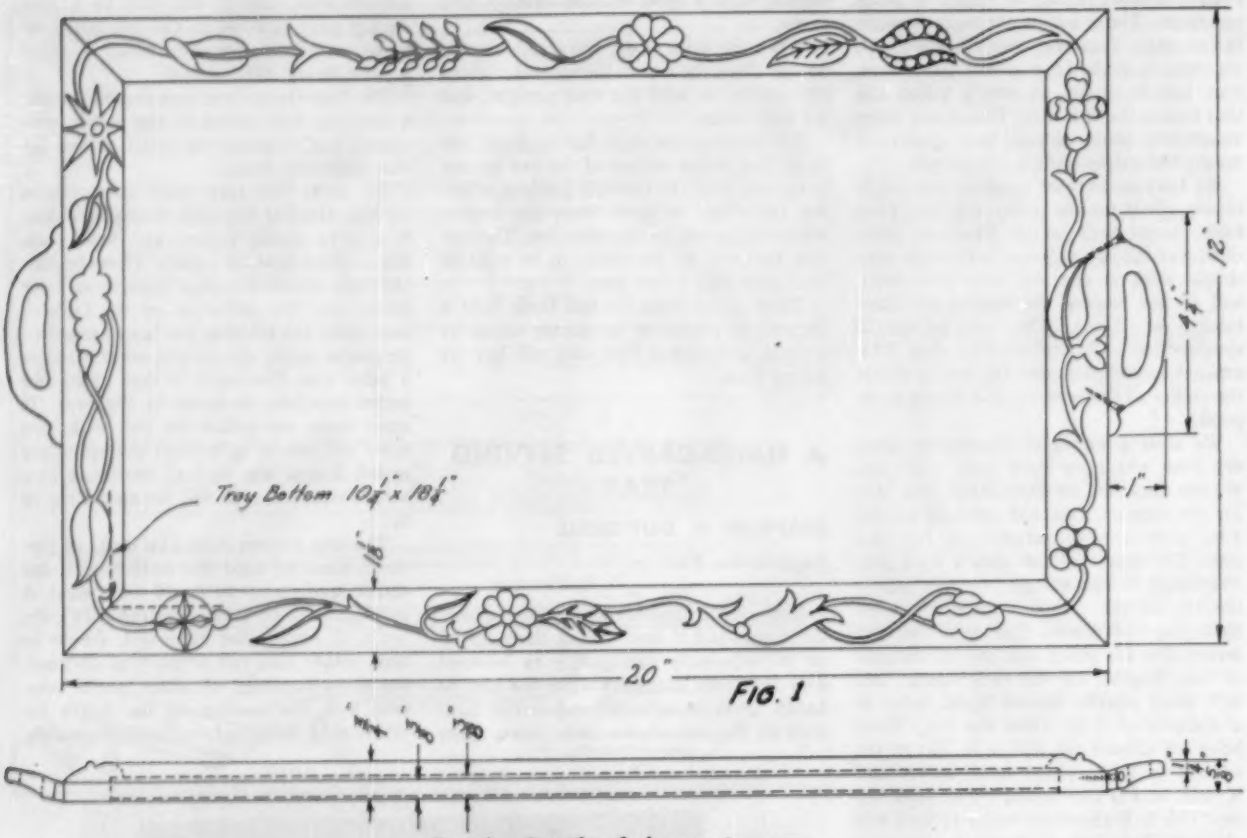
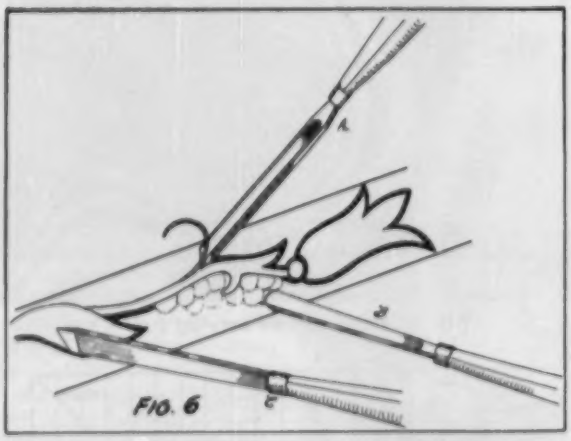


Fig. 1. Details of the serving tray



Outlining design with a V tool

The tray bottom may be glued and bradded to the frame, and will help to strengthen it.

Wooden handles should be made, and they may be fastened with glue and wood screws. It is best to fasten them after the carving has been done. Green felt should be glued to the bottom of the tray after all other operations, including the finishing, have been completed. All screw and nail holes should be filled in with plastic wood before sanding the tray.

Carving, which may seem like a mysterious process to some, may be attempted by almost anyone who works with wood. This is especially true if directions for starting to carve are followed, as shown in Figure 6. Before any carving can be done, it is essential to have the design carefully drawn or traced upon the frame. Full-sized patterns, made from the ones shown in Figure 3, should be used. All lines should be carefully trued up and corrected after tracing, so that the markings on the wood are distinct before carving is actually begun.

To carve the frame, first outline the design with a V tool, shown at A in Figure 6. Cut not much more than 1/16-in. deep at first, deepening the groove as needed once you have pared away some of the background with shallow gouge B, and have started the modeling with a skew chisel C, or with some other carving tool. Carving, such as this, may even be done with a sharp pocketknife, provided wood-carving chisels are not available. Wood-carving chisels make the job easier, of course.

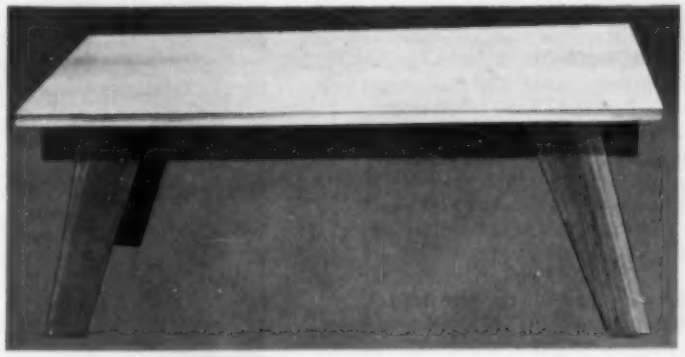
The tray shown, Figure 2, was first stained with burnt umber thinned with turpentine. To this mixture was added some paste wood filler. After rubbing this mixture into the wood thoroughly to fill the pores, and then carefully wiping off what remained upon the surface, it was allowed to dry for 48 hours. A coat of thin shellac then was brushed on. When this had dried the surface was rubbed smooth with 2/0 steel wool. After this had been carefully dusted off it was polished with floor wax.

If open-grained woods, such as oak, walnut, or mahogany, are used, wood filler colored with white paint, or white lead, may be rubbed into the open pores after staining the tray. After drying, a pleasing

effect is achieved by polishing this to a high luster with wax. Still another possibility is to varnish parts of the background, and then dust gold bronze powder over the varnished areas while still wet. Any dry powder which remains may be wiped off after the varnished has dried.

COFFEE TABLE

C. WAYNE CLOSE
Glendale, Ore.



Coffee table

This sturdy table will be welcomed in any living room because its features of a large top and sturdy leg construction are always valued.

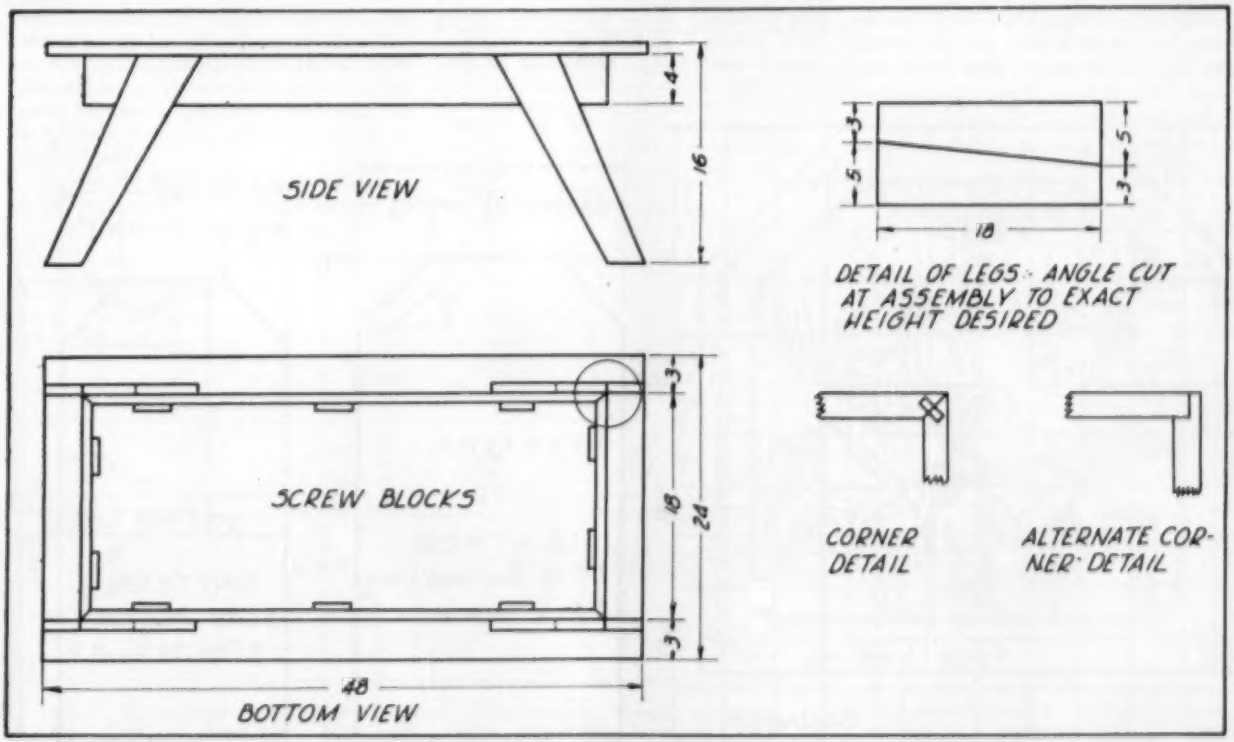
Walnut or mahogany are recommended for the table as these woods work well and will fit in with almost any furnishings. As a matter of economy, the table can be constructed of plywood, redwood, alder, or gum with nice results, although these woods are not quite as strong or as resistant to wear.

To begin construction, secure two boards, one, ¾ by 8 in. by 12 ft. and the other, ¾ by 8 in. by 8 ft. Cut the long board into three four-foot pieces and glue them together edgeways for the top. The legs are formed by cutting two 18-in. pieces from the remaining board. Divide each of these pieces lengthwise so as to form legs 5 in. wide at the top and 3 in. wide at the bottom. Note that the cutting of these legs is planned to eliminate waste. Cutting the legs to exact length and cutting the angles on the ends is done at assembly time. The underframe is simply a rectangular box 4 by 18 by 42 in. This frame is best constructed with spline mitre joints at the corners or a simpler rabbeted joint may be used. Assemble this frame with finishing nails and glue.

Begin assembling the table by locating the leg positions on the underframe sides. The end angles of the legs may be marked and cut now. The legs are each attached with four 1¼ in. by 8-in. flat head wood screws applied through countersunk holes from the inside of the frame. The top is attached by using triangular wood blocks drilled so that screws will go into both the top and the sides. Do not use glue.

After a careful sanding the table is ready for finishing. The finishing schedule will vary according to the wood and the color wanted but presuming that walnut has been used, the following will produce a good finish.

1. Stain with brown walnut stain to secure an even tone.
2. Apply sealer coat of white shellac thinned with four parts of denatured alcohol.
3. Sand with 8/0 finishing paper.
4. Apply second coat of sealer.
5. Sand with 8/0 finishing paper.
6. Apply two coats of alcohol and water resistant varnish.
7. Rub with pumice stone and oil, or for a quicker finish, rub with 3/0 steel wool dipped in paste furniture wax.



Details of the coffee table

LEATHER BOOK ENDS

W. P. KLINGENSMITH
Chicago, Ill.

Leather book ends

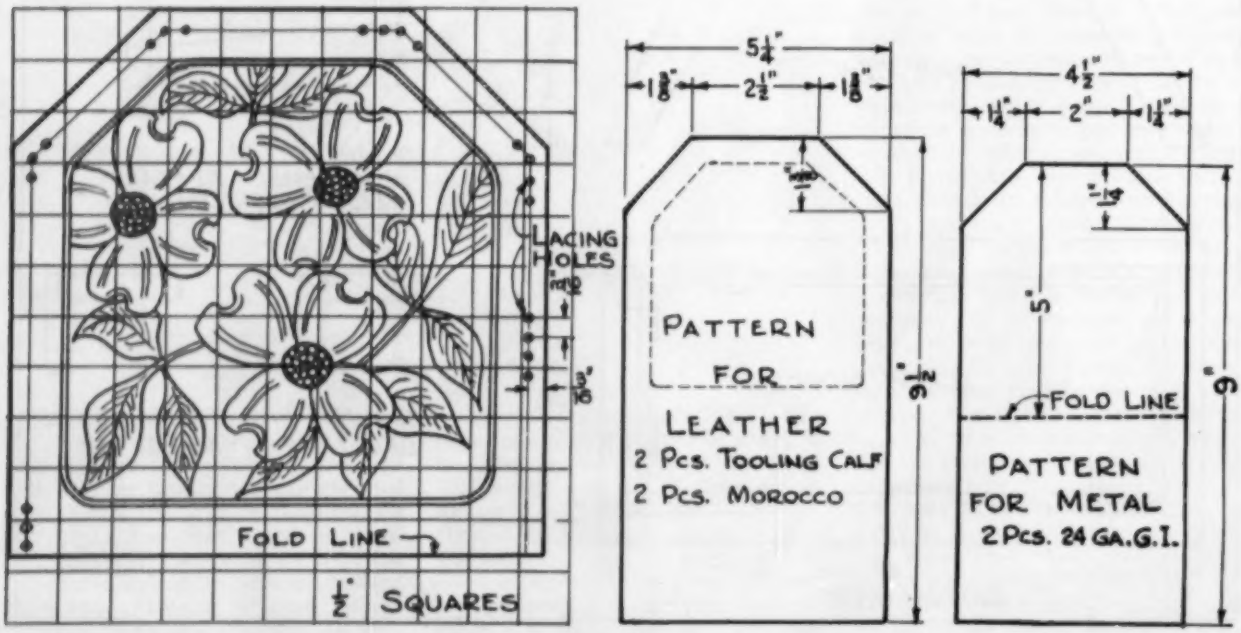
Almost everyone can use an attractive pair of leather bookends on his desk. The motif or design suggested is that of the dogwood. It should be drawn to the exact size on paper for tracing on the leather. Use 3½ ounce natural tooling calf for the outside of each book end. The lining, or inside, may be made of morocco leather. The form over which the leather is placed can be made of 24-gauge galvanized iron or aluminum.

Cut two pieces of tooling calf and two pieces of morocco to the sizes shown on the sketch. The cutting should be done on a piece of battleship linoleum using a very sharp knife and straightedge. Lay out and cut from the flesh side of the leather.

Moisten the tooling calf, with a little water in a sponge, on the flesh side until it begins to change color on the grain (hair) side of the leather. Put the moist leather on a smooth marble slab with the grain side up and then place the paper, with the design right side up, on the leather. Center the design and trace the design through the paper onto the moist leather. Use a straightedge to put on the straight lines in the border. When finished remove the paper.

Use a swivel top carving knife and carve each of the lines on a scrap piece of leather. Make sure you do not cut too deeply, only about one half the distance through the leather. When you carve the design on the book ends cut the flowers first, then the leaves and then the straight lines. Here again a straightedge should be used to guide the knife when carving the border lines. Do not use a metal ruler on moist leather as it will discolor the leather.

To get some depth or relief in the design use a beveler or saddle stamp No. 197 and a mallet. Move the beveler slowly while striking it with the mallet. This produces a beveled edge. First bevel the border, then the edges of the design, then the flower centers, and then the ends of the leaves. To get the design in the flower center, use a seeder stamp and strike it with the mallet. The background area is stamped down with background stamps Nos. 103 and 103½. The decorative cuts are made in the leaves and flower petals with the swivel top carving knife.



Details of leather book ends

When the leather is completely dry it may be given two coats of tan treeing compound. It should then be brushed vigorously. This will give the leather a beautiful natural finish.

Using a pair of tin snips cut two pieces of 24-gauge galvanized iron to the size shown on the sketch. File and steel wool the edges of the metal to remove all sharp edges or burrs. Bend the metal to a 90-deg. bend on the fold line as shown on the sketch.

To hold the leather to the metal form until you can get the project punched and laced, cement the two together with rubber cement. Apply a coat to the outside of the galvanized iron. Then apply a liberal coat of this cement to the back or flesh side of the carved leather. Work with only one book end at a time and cement only one side at a time. Center the metal form the leather. Fit it carefully around the bend in the metal form. Now apply rubber cement to the flesh side of the morocco lining and the metal form. Start with the top and line up edges of the leather. Cement lining to the metal form and the carved front until the lining covers the inside. Then trim the edges of the morocco to match the carved front. After the leather and liner have been cemented together, the other one may then be started.

In order to permanently hold the leather and lining of the book ends together, the edges should be laced. A combination punch with gauges is used to punch the lacing holes. Set the gauge so the holes are about 3/16 in. from the edge of the leather and about the same distance apart. Punch corner holes first, then the balance of the holes may be punched. Use 3/32-in. beveled goatskin lacing and use the double overlay stitch to lace the project. After the lacing is finished, flatten it with a mallet on a marble surface.

To give the book ends a highly polished finish, apply a coat of neutral (clear) wax. This can be applied with a soft cloth and then should be brushed vigorously. The book ends are now ready for use.

A NEW STRUCTURAL MATERIAL FOR THE SCHOOL SHOP

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The Milwaukee-Downer College
The Stout Institute, Summer Session
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Fiberglas Reinforced Polyester Resin and Honeycomb Core

Honeycomb core is a vertically corrugated paper structural material of much more importance than the word "paper" might suggest. When it is faced with Fiberglas reinforced resin it is hard to believe what strong and feather-weight structures are obtained. In industry, as might be guessed, this combination is already used on the strong leading edges of high speed planes, and it is being tested for building construction, partition panel, and other uses.

Because its fabrication is without complication, it fits easily into the present school shop program without need for special provision of any kind. It is typical of the new concepts of design and materials, and schools will find satisfaction in the thought that with its use, they will be pioneering side by side with industry at the forefront of a new field.

Reinforced plastics, we know, are strong. In this new application there are two layers of reinforced plastics plus a structural stiffness as well. This is an outstanding advance. With the paper lending both stiffness and thickness, a reinforced plastic faced honeycomb cored panel has carried forty people in a span of 12 ft. with extremely little deflection. Building walls and roof of 1½ in. thickness have been successfully tested in actual use at the Forest Products Laboratory, Madison.

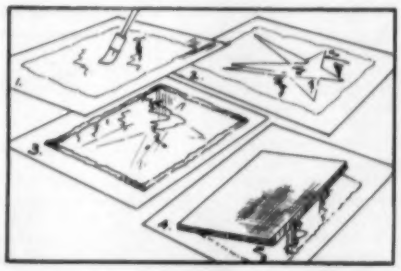


Fig. 2. Embedding wood or metal cut-out pattern into a table top. 1. Coat glass with clear resin mix. 2. Dip components into resin. Set into wet plastic, and weight each piece. 3. When set, add a wax wall around the area and fill evenly with resin mix. 4. When set, add wet resin and fiberglas and then a honeycomb layer

Honeycomb Core — A Product of Industrial Economy

Lightness with strength plus economy is a major objective in industrial research. Strong, lightweight projects at fair costs to schools therefore, from an industrial viewpoint, are a natural consequence of present thinking, and reinforced plastic may be looked upon as the new material of the hour. Up to now it lacked an all-round useful stiffener for thin laminations. Today, honeycomb core material is the low cost answer to the urgent need for both lightness and rigidity. It thus opens the field to greater benefits from the phenomenal strength of Fiberglas resin fabrications.

Honeycomb Core Material in the School Shop

Schools can readily apply honeycomb core panel where wood had been used previously. Students will welcome the change.

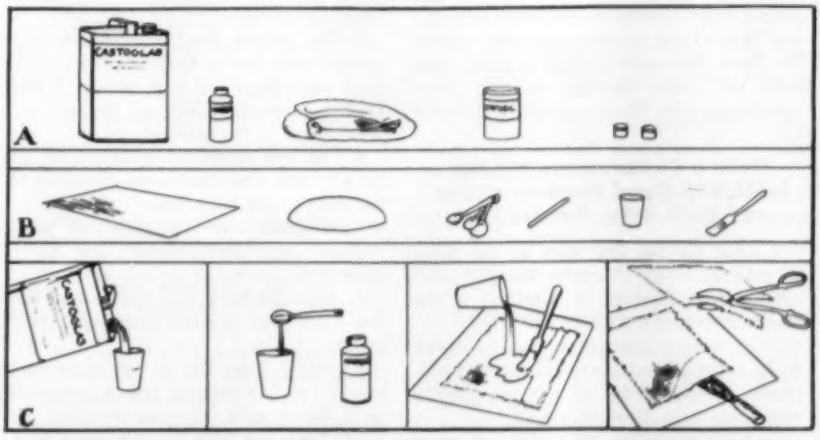


Fig. 1. The materials, the tools and the process: A.Resin, Hardener, Fiberglas cloth, Glass fiber, Color. B. Sheet glass, Wood mold, Spoons, Cup, Brush. C. Measure. Add hardener. Apply to fiberglas. Remove

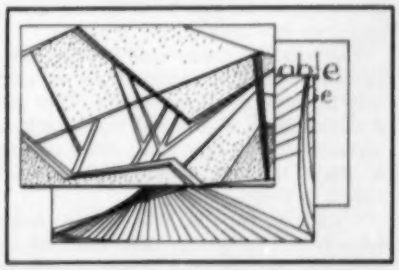


Fig. 3. Crayon or painted patterns, done on organdy cloth, for embedment in table top plastic-honeycomb laminations. Line drawings in a green-blue range of color, some areas in solid pastel shades

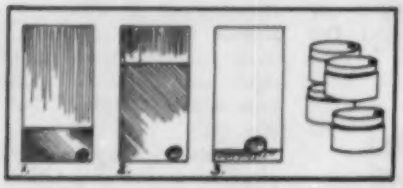
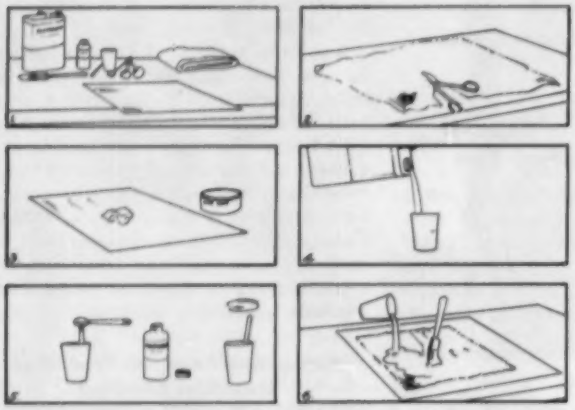
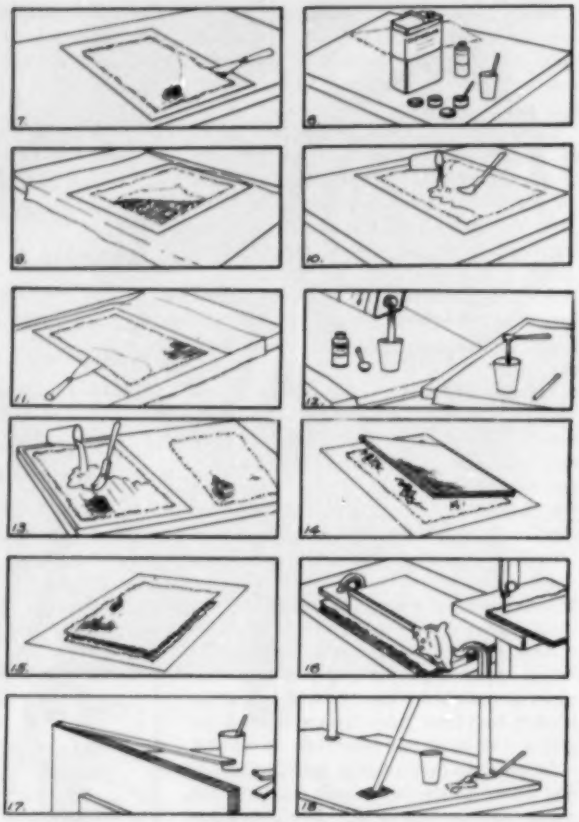


Fig. 4. Beautiful shades of Castoglas color are obtained through mixing. Reading from top color down, approximate proportions are: 1. blue, green, red; 2. white or blue-green, red; 3. white, green, red



1. Assemble supplies. 2. Cut two pieces of fiberglas cloth. 3. Wax the glass work sheet. 4. Measure two ounces of Castoglas. 5. Add ¼ teaspoonful of hardener and stir. 6. Pour mixture over one sheet of fiberglas cloth. Spread evenly. 7. Remove cast sheet when hard. 8. Mix more resin. Add color if desired. 9. Or provide patterned fabric for embedment in top layer. Set face down under fiberglas. 10. Pour plastic mixture and brush out evenly. 11. Remove casting and replace dry on glass sheet. 12. Mix two ounces resin with ¼ teaspoonful of hardener and stir. 13. Apply to rough side of hardened lamination. 14. Cut honeycomb and set into wet resin. Weight the



honeycomb. 15. When set, apply resin mix to second laminated sheet. Set open side of honeycomb into wet resin, and weight it. 16. When hard, trim to size with band or hand back saw. 17. Fill outer edges with wood or plastic strip. Cement with resin mix. 18. Attach legs and braces with resin mix. Reinforce with fiberglas strips

Honeycomb core resin faced panels are more quickly made than handmade wood panels are glued up and squared. Then there are these other qualities: the panel may be faced with excellently toned color, as in Figure 4; or decorative designs may be drawn on cloth and embedded as in Figure 3, or purchased fabrics may be embedded in the top layer of the laminate. Likewise, bamboo mat or ground cork or an inlay design of wood or metal components may be put into the top layer, as shown in Figure 2.

This article features four new projects, all in the furniture category and all built with the honeycomb core panels. They are a writing table, a book and model shelf, a magazine display case, and a tilted reading or music table, as shown in the dimensioned drawings.

Classroom work with laminating resins requires no lengthy experimentation. Directions are clear and very simple so that an organized student group can follow the directions without trouble. Furthermore, while the class may first make the suggested projects given in the beginning lessons, the work is of a nature that easily lends itself to creative thinking and effort. Students will think of scores of applications: the field is fresh and untried.

The basic laminating and coring process, consisting of facing the honeycomb on both sides with reinforced plastic sheet, is explained step by step in the small consecutive illustrations accompanying this article. To show how such laminated panels are used, the article features the four mentioned examples. These are built as follows:

Make a Contemporary Writing Table With Cored Plastic Panel Top and Shelf, Using Wooden Legs

1. Cast the top and shelf in one piece if possible, using Fiberglas faced honeycomb core, following the directions in the small illustrations, 1 to 15.

2. Trim edges and cut to size, as shown in 16, using a band saw; or if cut by hand, clamp a straightedge to the top against which use a backsaw as shown.

3. Fill outer edges with strips of wood or laminated plastic, cementing them with a Castoglas mixture made up of the resin, hardener, and enough Castosil, a chopped glass fiber, to make a paste. See sketch 17. Fill all joints and crevices. When hard, sandpaper.

4. Cut a pair each of front and rear leg parts, plus the back brace pieces. See sizes in the dimension drawing. Round these pieces on all sides.

5. Cut ⅛-inch deep grooves into three sides of rear legs at shelf level, and notch shelf accordingly, so that at the joining, shelf notches slide into leg grooves at a point given in the drawing.

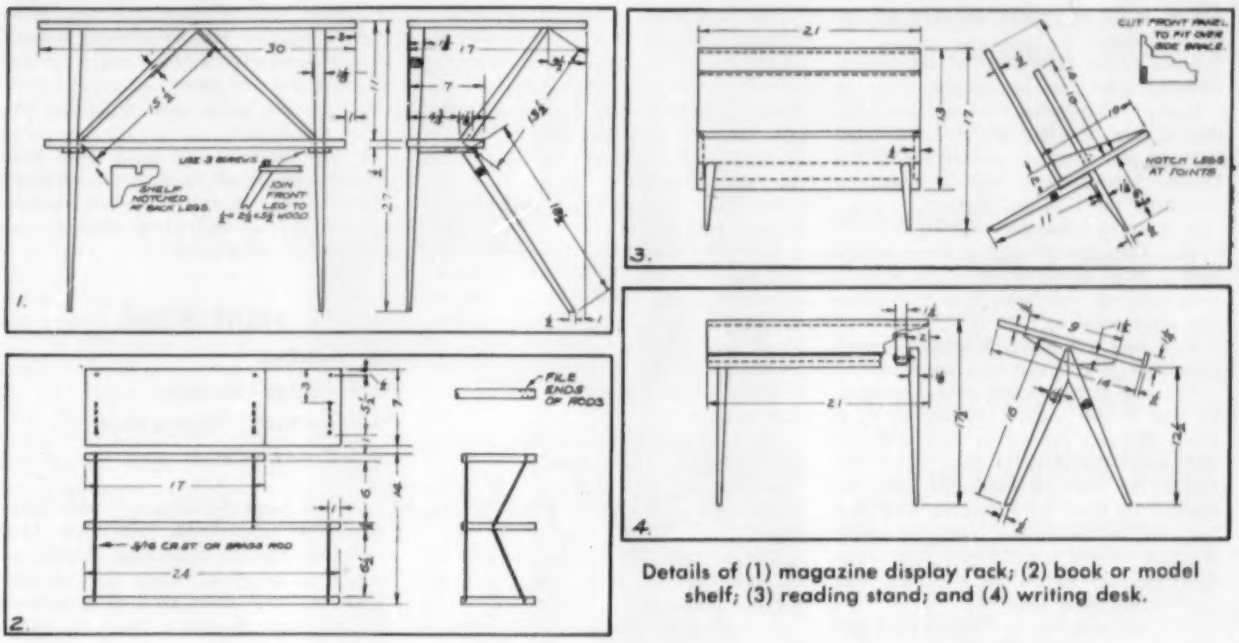
6. Cut two hardwood pieces ½ by 2½ by 5½ and glue and screw them to the top ends of the front legs.

7. Roughen with sandpaper all plastic surfaces on which pieces are to be cemented.

8. Assemble back legs to the shelf with the Castoglas mixture mentioned in 3, above.

9. Attach front legs to bottom of shelf, gluing the intermediate boards mentioned in 6, above, with the same cement.

10. Turn the table top, bottom side up, and cement back legs to underside, sketch 18, propping the units during the cementing. While so held, cement front and rear



Details of (1) magazine display rack; (2) book or model shelf; (3) reading stand; and (4) writing desk.

braces, reinforcing all underside joints with small strips of Fiberglas cloth. Turn table up when cement is hard. Check and fill all crevices.

Make a Book and Model Shelf

1. Cast the three shelves in one if possible, using the Fiberglas faced honeycomb core according to the directions in the illustrated instructions, 1 to 15.

2. Mark and cut the shelf sizes, using the directions in 2, above.

3. Face all outer edges with wood or plastic strips, filling all joints with Castoglas paste as in 3, above.

4. Drill 5/16-in. holes where rods are to join the shelves.

5. Cut cold rolled steel or brass rods. Those at the left end are full length. Others are short. File all rod ends, cutting cross grooves so that they may better hold the cement.

6. Insert the long rods and cement them. Fill holes generously inside the core and insert the remaining rods. Prop in accurate position until hard.

Make a Book and Magazine Display Case

1. Cast three pieces of Fiberglas faced honeycomb core, as per instructions numbered 1 to 15.

2. Mark and cut pieces to given sizes.

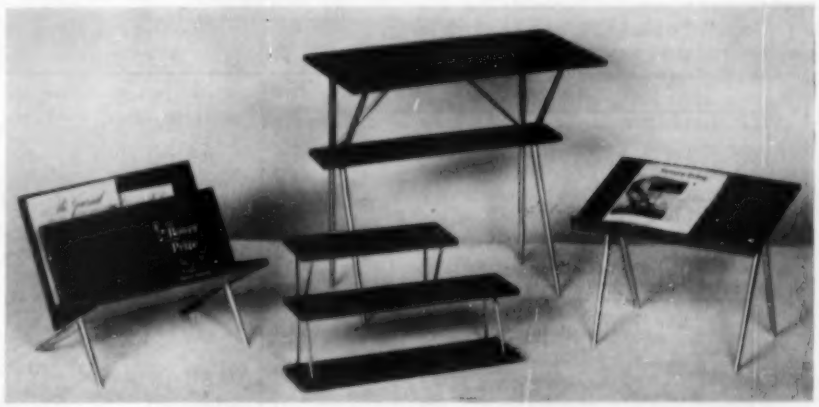
3. Mark and cut front upright to receive the triangular wood braces.

4. Face all visible outer edges of the laminate with wood or plastic strip, and fill all joints and crevices with Castoglas paste, as in 3 of the first project.

5. Make the two triangular wood braces of ½ inch walnut wood. Also make two front and two back legs, notching them as shown.

6. Prop up panels and cement all joints, using the Castoglas paste as in the edge joints, above.

7. Roughen with sandpaper the bottom plastic areas where legs join, and cement the legs. Prop them while they are hardening.



Various items made with the new structural material
— Photographed by Milwaukee Commercial Photographers, Inc., Milwaukee, Wis.

Make a Reading or Music Stand

1. Cast a piece of Fiberglas faced honeycomb core as in the instructions 1 to 15.

2. Mark and cut pieces to size.

3. Make a front strip of ½ inch walnut, and cement this to the front edge of the laminated board, using the cement in 3, of the first project.

4. Cement walnut strips to the remaining three sides. Fill all joints with Castoglas paste.

5. Make the two assembly pieces and cement them to the bottom.

6. Cut and taper four legs. Join pairs with dowel and the Castoglas paste. When hard, face the inner area at the joint and screw them from the inside to the assembly pieces. The table may be made to tilt at will.

Questions and Answers

What is the advantage of honeycomb core structure over that of wood?

1. The project is light to handle, and it is strong.

2. It is new, and it is typical of the age.

3. It lends itself to a greater variety of creative possibilities.

4. It is its own finish and will require no refinishing.

What is the advantage of honeycomb structure over plain lamination?

Honeycomb supplies thickness and stiffness in one operation. Where stiffness and lightness are required, honeycomb is the answer. Strength may still be added by increasing the Fiberglas layers.

Is there an economic advantage?

Yes. Thickness by adding layers of Fiberglas might be costly, unless the strength were required. Otherwise, honeycomb core is a great economy.

How does a honeycomb table top compare in price with that of a wood top?

The cost of honeycomb core lamination, as used in the projects of this article is about 80 cents per square foot, which is just about the same as good wood. The cost of the magazine and music stand, for example, is about $2 altogether, with legs.

Could the honeycomb core type plastic laminate be used to build waterproof structures such as mobile water or oil tanks and pontoon type piers?

Yes, this structure is ideal for such purpose. The retaining face coats are strong and rigid, weather, water, and cold and heat proof.

Does honeycomb come in other sizes?

Many types are being manufactured, including treated cardboard and aluminum types in a variety of thicknesses and corrugation patterns. The ½-inch untreated type, however, was thought to be excellent for schools. It is the only type carried by the plastic supplier.

Are other core materials used with reinforced polyester plastics?

Many types are used, such as Masonite, cellotex, wallboard, wood, and aluminum, depending on the purpose of the structure. Comparing these, honeycomb is amazing for its rigidity and strength for weight, plus its low cost.

Where is the recommended honeycomb core sold?

The Castoglas plastic supplier, the Castolite Company, is the supplier.

What is the relationship of the honeycomb core area to the laminating resin field?

The polyester laminating resin field may be viewed roughly as in three equally important divisions:

1. Casting of laminates over forms, as in the making of bowls, covers, chairs, car bodies, and boats.

2. The fabrication of structures from cast sheet, cut to shape and size, recemented, supplied with steel inserts such as pins, sockets, clamps, etc., and given reinforcing ribs and gussets of plastic. Such structures are tanks, tool trays, jigs, fixtures, guards, etc.

3. The lamination of resin faced honeycomb core panels used in the furniture described in this article, and in building construction, as well as in nautical and aeronautical construction.

FRUIT BOWL

LEE ARNOLD
High School Instructor
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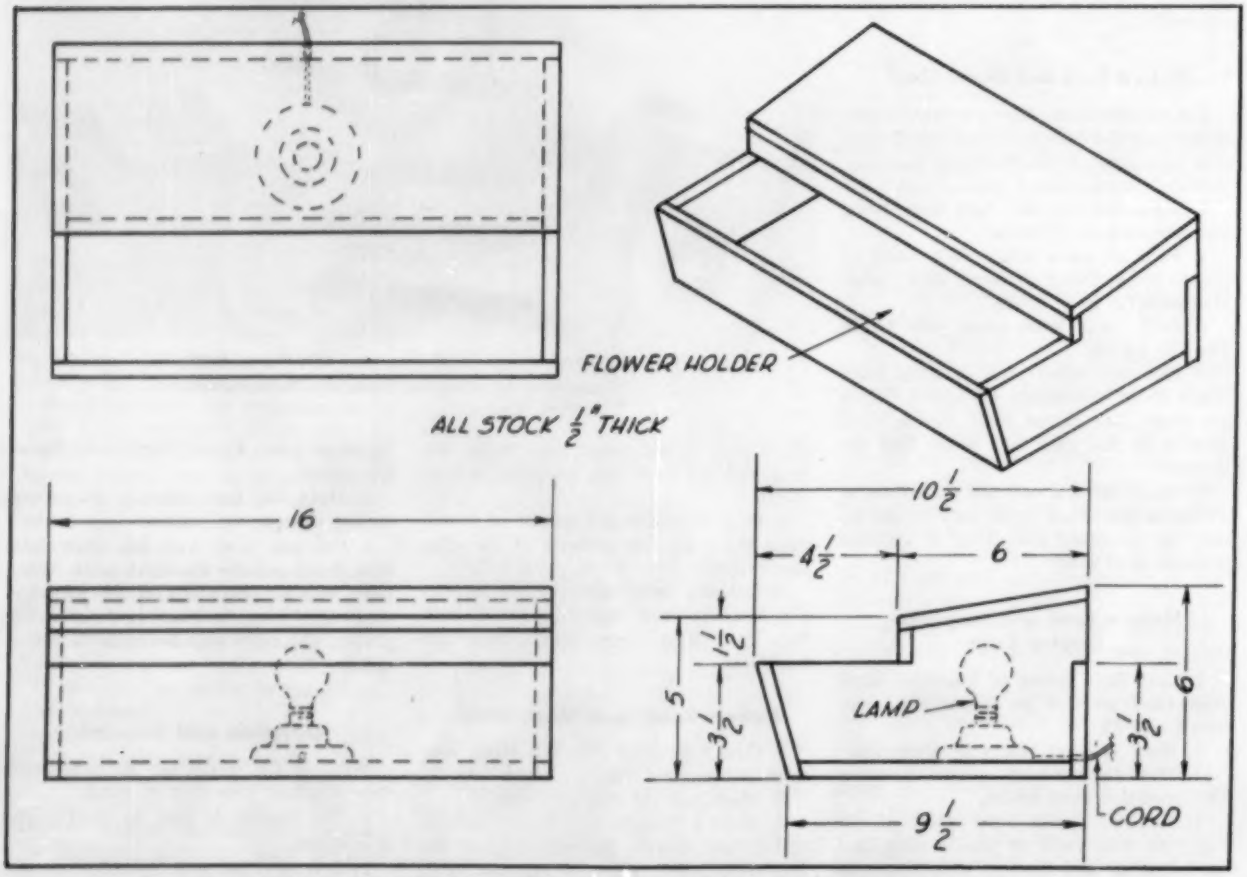
Besides being an attractive table decoration or buffet piece, the fruit bowl shown in the accompanying illustrations serves as a good vehicle for teaching brazing in the school shop. It is suitable for beginners in either junior or senior high school. It is a popular project and can be made for about a quarter of what it would cost if purchased at retail. It is

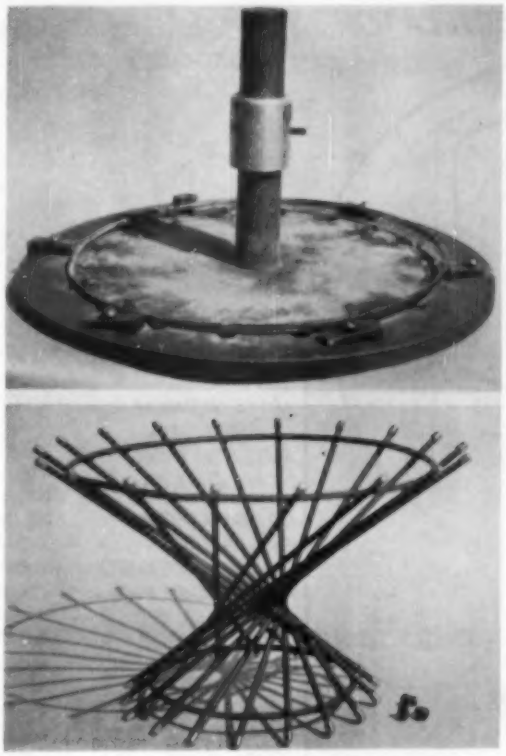


Details of the television flower-holder lamp by George V. Cardinale, woodworking instructor, Roosevelt Junior High School, Erie, Pa.

timely because gift shops and home furnishing stores are showing a great deal of this type of iron ware.

It is necessary to make a fixture for holding the pieces while being brazed. For durability it was found best to use a piece of heavy boiler plate, or some other flat metal ⅜ or ½ in. thick as an aid in making it. A piece 14½ in. in diameter is cut on a band saw or with a torch. With dividers locate on this plate and prick punch, 18 holes equally spaced on the circumference of a circle drawn with a 5 15/16-in. radius. Drill holes with a ¾-in. drill 5/16 in. deep. The drill should be sharpened to about a 90-deg. included angle, so that you will have a V-shaped hole 5/16 of an inch deep. These holes are to hold the rods evenly spaced. A round bar of steel 1⅜ by 8 in. is welded to the center of this plate and checked for perpendicularity. A collar with a thumb screw is made to fit over the bar. This is to adjust the height and shape the bowl, after all pieces are in place.

A ring should then be made as part of the fixture. It is 12⅜ in. in diameter, and is clamped over the outer edge of the holes to hold the bowl together while brazing. Clamps may be used for this, or screws with clamps attached to the fixture is better.



Fixture for welding rods in position, and (lower) the fruit bowl of cold rolled steel

BILL OF MATERIAL FOR THE BOWL

18 pieces 3/16 by 12-in. round cold rolled steel
1 piece 3/16 by 32¾-in. round cold rolled steel for large ring
1 piece 3/16 by 18½-in. round cold rolled steel for small ring.

Form the two rings and braze or weld to make a complete ring.

To assemble the bowl, place large ring on plate, and clamp outer ring at edge of holes. Begin placing 12-in. pieces in holes and pointing across round upright of fixture. This sometimes requires an extra hand. When all are in place, wrap a piece of wire around the narrow part and twist tight. Since the bowl is in an upside down position, braze the small ring in place. Then shim up the large ring to form contact with side pieces and weld or braze the rods at each contact.

Clean and spray the bowl a dull black. Brass feet or plastic knobs are used to set it off. Plastic feet or knobs of various sizes at a reasonable cost may be obtained from: Small Parts, Inc. Manufacturers and Distributors, 1432 South Los Angeles Street, Los Angeles 15, Calif.

Companion candlesticks and lamps may be made to match by varying the size of the fixture.

Candlestick to accompany the iron ware fruit bowl

Thermal barrier in jet engines has been pushed back a few more notches with a new high-temperature alloy containing added rare earth elements. The metal, a cobalt-base alloy, possesses *improved rupture and stretching strength*, even for 1700-degree F. heat, according to Naval Research laboratory. Use is indicated for turbine blades in jet engines and gas turbines. — *Industrial News Release.*

A PHONO-OSCILLATOR FOR THE GENERAL SHOP

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Assistant Professor of Manufacturing Processes
and
W. O. SATTERLEY
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Purdue University
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An interesting project which has appeal and intrigue for persons of all ages is the combination phonograph-oscillator. Being constructed of metal, it provides a suitable project for any general shop program where sheet metal and electricity are taught.

The unit is in reality a miniature broadcast station of a few milliwatts power output. It will function properly within a radius of 100 feet or less. If the range is permitted to increase beyond this it interferes with neighborhood radio reception of standard broadcast programs. There are two ways to control this behavior. One is to use a minimum length of antenna for radiation, thus limiting the power output to a short distance. The other is to construct the tank circuit in such a manner that the fundamental frequency will fall near the top of the broadcast band, then all harmonics will fall outside the broadcast range.

The model described has a variable tank circuit pitched to the higher frequencies and which can be tuned within several kilocycles so as to be located in a dead spot between stations.

The cabinet design makes a very attractive unit when wrinkle finished or flocked. There are some points in the fabrication of this cabinet, however, which should have special mention. If possible, use cold rolled steel. It will spot weld easily, and can be soldered if necessary. It will also hold paint well. The layout shown is for the Alliance motor with an 8-in. turntable. It must, of course, be modified for a different type motor. In making the bends along the notched portion of the side section keep the brake line right on the apex of the angular cuts, otherwise a series of fine pinholes will occur along the edges of the curved portions when filed down.

There is also the matter of filing down the joining edges of the top and side sections smoothly. This may appear difficult. However, if the top section is held out even with the side section in such a manner that a straight edge will touch both of them and fastened in this position the task becomes simple. The top edge is tapped lightly with a small hammer and bent around the corner gently. With care it can then be filed down until it becomes difficult to see where the metal is joined.

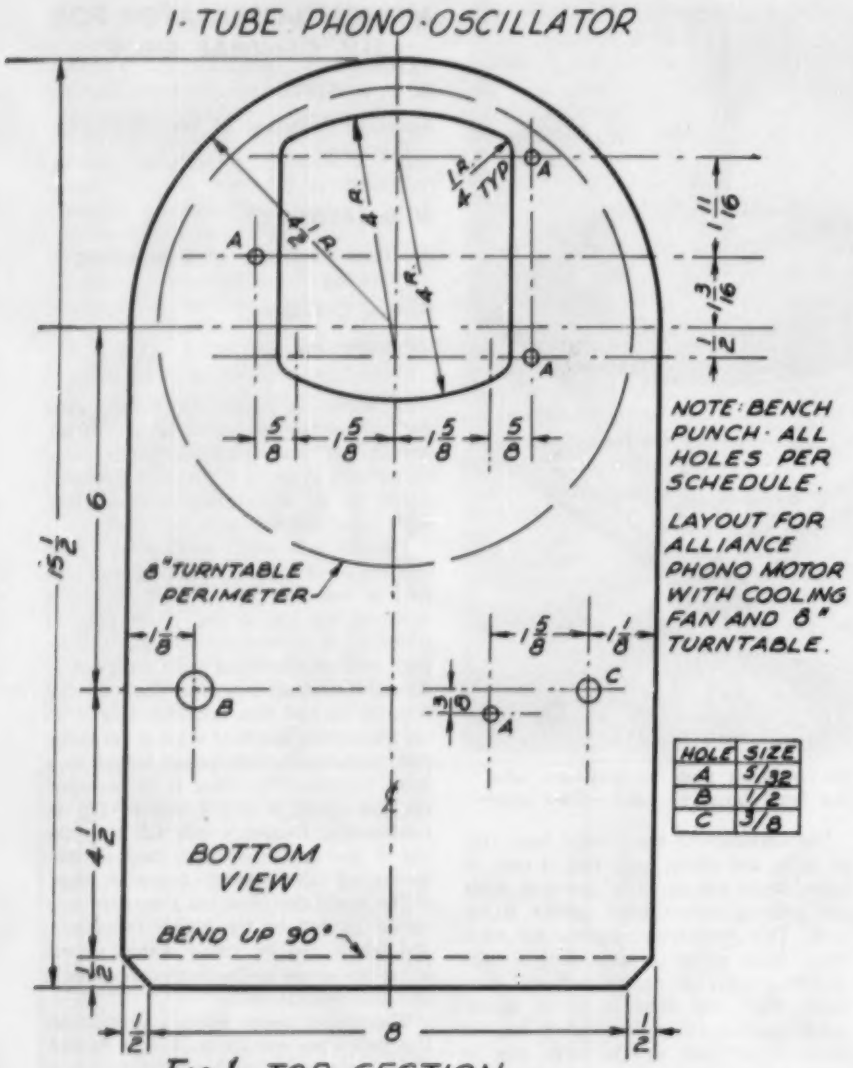


FIG. 1 TOP SECTION
24 GA. C.R.S. 1 REQ.

The last important point to be emphasized is that of keeping the whole chassis and cabinet free from any connection with the 110 volt circuit. This is an a.c.-d.c. type of circuit, and severe shock can result if this is not observed. If the 20-20-20 mfd electrolytic filter is enclosed in a metal shell be sure it is insulated from the chassis in some manner when mounting.

Other points are shown clearly in the step-by-step sequence. A demonstration by the instructor when given at the points indicated, will pay big dividends. These plans have been used in actual classwork, and they have been found very helpful.

BILL OF MATERIALS

The materials and parts necessary for building the unit are as follows:

1 pc. C.R.S., 24 ga., 15½ by 9 in. for top section
1 pc. C.R.S., 24 ga., 33 by 3½ in. for side section
1 pc. C.R.S., 24 ga., 9 by 5½ in. for bottom section
1 pc. soft aluminum, 18 ga., 10 by 2½ in. for chassis section
1 Phonograph motor with 8-in. turntable (Alliance)
1 Phonograph pick-up arm with crystal cartridge
100 mmf variable air trimmer
6 foot 110 volt line cord
On-off switch
Octal-tube socket
.05 mfd tubular capacitor
.01 mfd tubular capacitor
20-20-20 mfd, 150 wvdc, electrolytic capacitor
560 ohm, ½ watt, carbon resistor
22,000 ohm, ½ watt, carbon resistor
15,000 ohm, 1 watt, carbon resistor
Three rubber mounting feet for cabinet
Rubber grommet for ¼-in. hole
Rubber grommet for ⅜-in. hole
Flexible antenna wire 18 in. long
Mounting hardware
2 feet of hook-up wire

Directions for Fabricating 117L7 Phono-Oscillator

I. Fabrication of Metal Cabinet

Top Section

1. Obtain stock for top of cabinet from stockroom. File off sharp corners and edges.
2. Use one end and one side for reference edges.
3. Make layout of top section as shown in Figure 1.
4. Prick punch, then centerpunch all holes to be drilled or punched.
5. Carefully recheck layout measurements before drilling or punching.
6. Drill or punch as indicated. Place wood block beneath metal for drilling.
7. Cut or shear metal to be removed from section. Use aircraft shears for removing metal for motor mounting.
8. Tap down and file off any sharp edges resulting from shearing.
9. On the sheet-metal brake bend the straight end to 90°. This bend must be down when looking at the top section with the ½-in. pickup arm hole on the right and between the observer and the motor mount hole.
10. Procure special end form block and insert the above bend in the slot. Lay on bench with block on top and gently roll the block with the metal beneath until a full ¼ of a cylinder is formed in the top section.

1. Obtain stock for side section from stockroom. Remove sharp edges.
2. Make layout. Use protractor head to measure angles. Recheck again before punching and cutting.
3. Punch and cut out sections to form indicated in drawing. Remove sharp edges and corners.
4. Bend as indicated on each side on sheet-metal brake.
5. Procure special end form block and clamp in vise along arc with 2½-in. radius.
6. With small tapping hammer gently tap ends around arc to blend in with sides.
7. Procure 8-in. semicircle form and mount in vise with curve upward.
8. Instructor to give a demonstration at this point. Center the metal over the block with bends downward and gently bend around curve.
9. Use rawhide hammer and tap down any portion that may appear stubborn.

Side Section—See Figure 2

1. Inspect for smooth contour at points to be welded. This applies to both pieces of metal.
2. Fit two ends of side section to top section and fasten temporarily at 2½-in. arcs with a small *C* clamp.
3. Work curves on side and top section together for trial fit.

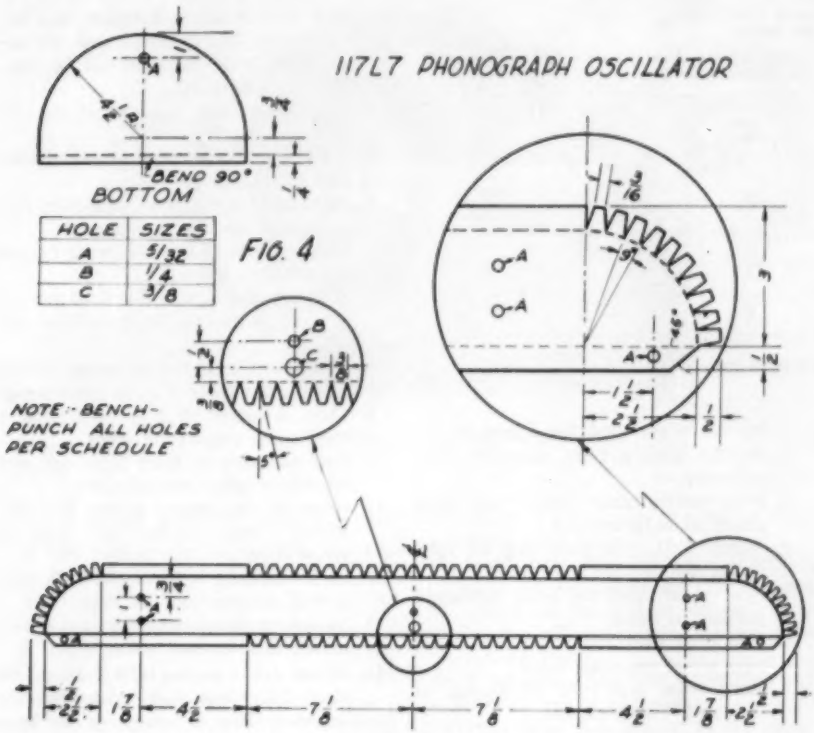


FIG. 2 SIDE SECTION

4. If side section is not of proper length it can be varied by tapping more or less metal around the 2½-in. arc on each end.
5. Instructor to give a demonstration at this point. When proper fit has been attained, see that side section is pushed in flush with edge of top section and make first weld at center of 2½-in. arc.
6. Proceed with welds ½ in. apart around the arc and on to the beginning of the 9-in. semicircle at the other end. Figures 1, 2, and 3.
7. Do the same on the other side, keeping side section flush with top section.
8. Now weld one spot on one side of the arc, then cross to the other, thus alternating the welds until they meet at the center of the 9-in. semicircle.

Tapping and Filing Welded Joints

1. If craters are produced by welding, tap them out flush by hammering them from the inside against the layout plate.
2. Clamp straight side section in vise with iron bar on inside of cabinet. Use swivel vise.
3. With small tapping hammer, tap top section down over side section. Do not strike hard. Instructor gives a demonstration at this point.
4. With medium file, the top section is first filed down smooth, then the filing is continued around and down the side until the top and side blend into a solid piece of metal.
5. Avoid filing from the side up against the top section. This will roll the metal back.
6. When all joints are filed as desired, the surface is then smoothed down with emery cloth to remove all file scratch marks.

Inserting Bottom Section — See Figures 3 and 4

1. Obtain metal for bottom section layout and cut to specifications. Fold ¼-in. hem on straight edge.
2. Insert squarely with side sections and firmly against 9-in. semicircle. Use metal square for squaring bottom with sides. Instructor to demonstrate how this is done.
3. Clamp at two corners with *C* clamps.
4. Spot weld around 9-in. semicircle for about 45 deg., and on each welding tab by inserting the lower welding tip through the motor mount.
5. Drill hole on each side ½ in. up from edge of bottom section and in center of ½-in. bend along side section. Fasten with two 6-32 machine screws.
6. Tap or file off any sharp edges remaining on the bottom after welding.
7. Present to instructor for grading before painting.

Spray Painting Wrinkle Finish

1. Clean surface to be painted with *Metal-Prep* and soft cloth, not cotton waste. Wipe off while still damp. Insert necessary screws.
2. When dry, place on turntable on side and spray inside of cabinet with a very thin protective coat to arrest rust. Instructor to demonstrate how this is done.
3. Spray one heavy spot inside and stick name label in place for identification.
4. Place on turntable with top side up and proceed with top surface.
5. These four points must be followed in order to do a good job.
   1) Be sure all dirt and grease is removed from the surface of the metal.

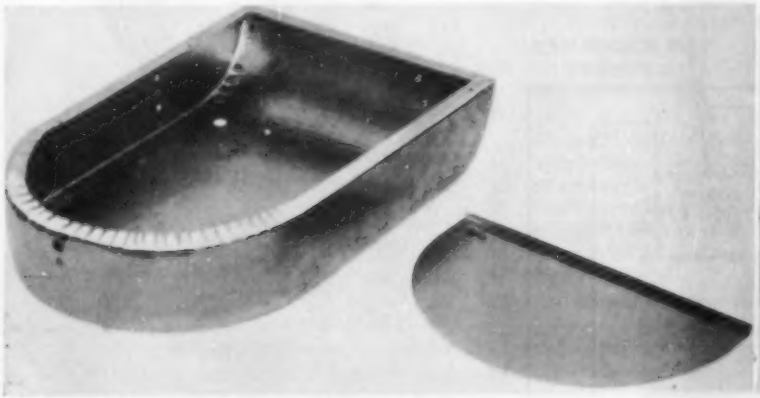


Fig. 3. Top and side welded together

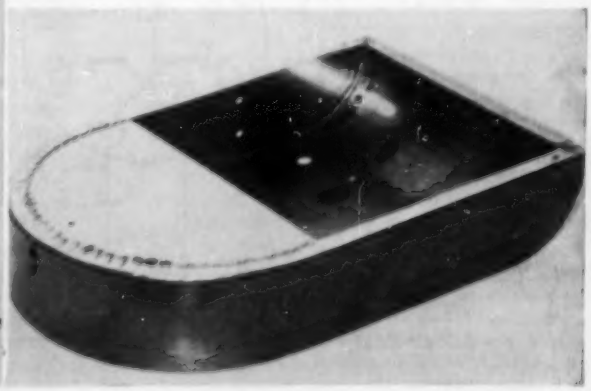


Fig. 5

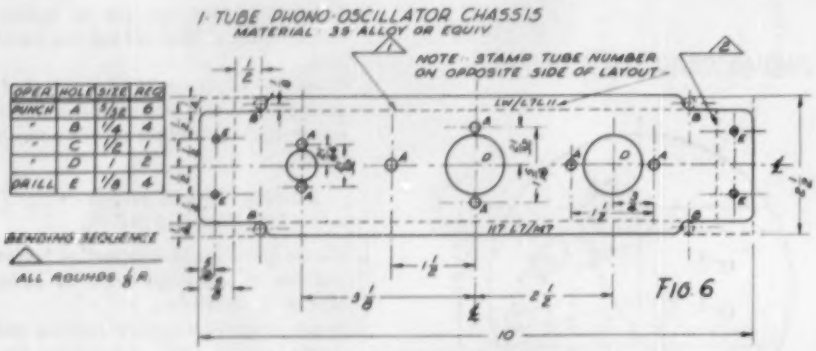

1-TUBE PHONO-OSCILLATOR CHASSIS
MATERIAL 39 ALLOY OR EQUIV
NOTE: STAMP TUBE NUMBER ON OPPOSITE SIDE OF LAYOUT
OPER | HOLE SIZE | REQ
PUNCH | A | 3/32 | 6
" | B | 1/4 | 4
" | C | 1/2 | 1
" | D | 1 | 2
DRILL | E | 1/8 | 4
BENDING SEQUENCE
ALL ROUNDS 1/8 R
FIG 6
10

Fig. 6. Electronic unit

2) Keep spray nozzle of gun the proper distance from the surface being painted to atomize paint thoroughly.
3) Cover surface sufficiently to provide good wrinkle texture.
4) Do not attempt to remove a portion of the paint at some point then repaint. The whole surface must be applied in one continuous coat.
6. To place in oven insert hand into motor mount hole, spread fingers and lift.
7. Leave in oven at least 24 hours before handling.

II. Fabrication of Electronic Unit — Chassis

1. Procure aluminum from stockroom and lay out as sketched. See Figure 6.
2. Protect surface from excessive deep scratches.
3. Prick punch, center punch, and bench punch all holes indicated.
4. Stamp 117L7 on each side of tube socket hole as shown.
5. Saw, shear, and file away unwanted portions of metal.
6. Round off sharp edges and countersink tube socket mounting holes.
7. Bend sides, then ends to 90 deg. as indicated. Polish topside.

Mounting Electronic Components

1. Procure coil form and three small brass screws from stockroom.
2. Drill No. 40 holes for screws, and not too deeply. One in center and two ¼-in. from ends of form all in line. Measure accurately.
3. Drill No. 40 hole in center of one end and 1 in. deep.
4. Screw form on mandrel of coil winder and set counter to zero.
5. Clean end of enameled wire with fine sandpaper down to pure copper.
6. Leaving ½ in. of wire out, wrap 7 turns around first screw.
7. Start winding slowly. Get first turn on straight. Instructor to show how this is done.
8. At 40 turns wind 5 turns around center screw and remove 2 in. of the enamel.
9. Loop in center of 2 in., and wind 5 more turns around the screw.
10. Continue with 40 more turns and end up with winding around screw.
11. Clean off the enamel of the last end. Remove from winder. Lay wire in screw slots.
12. Solder securely in slots. Give the wire a coat of dope and let dry.
13. Mount on chassis with 6-32 screw, terminals toward tube socket.
14. Mount triple section (20-20-20 mfds) electrolytic capacitor with bakelite washers. This is necessary to keep 110 volts from chassis and cabinet.
15. Mount tube socket with flat head 6-32 screws. Insert terminal strip under each side of socket when mounting.
16. Mount 100 mmf trimmer capacitor.

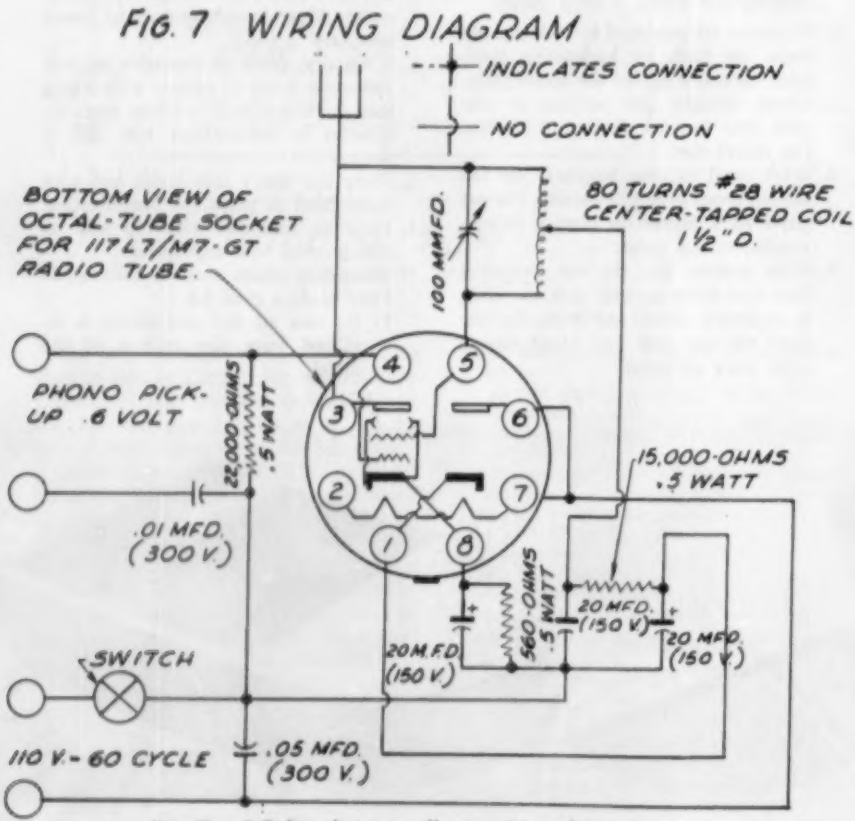


Fig. 7. 1-Tube phono-oscillator wiring diagram

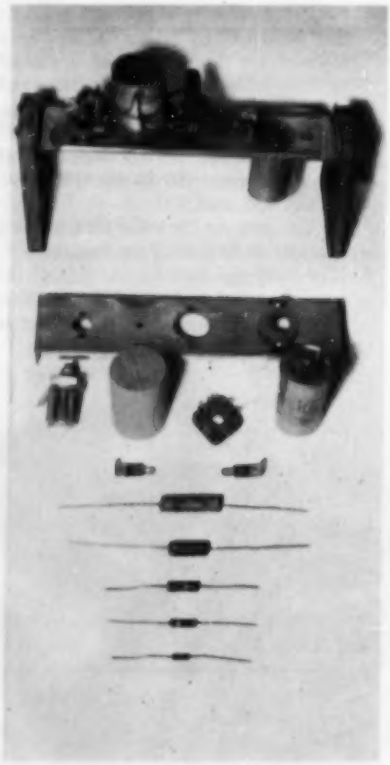


Fig. 8. Parts of oscillator chassis

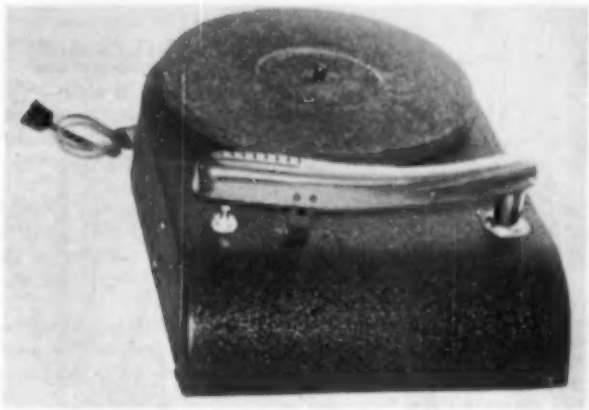


Fig. 9. The phono-oscillator

Wiring Electronic Circuits

1. Get hookup wire, solder, iron and rack from stockroom.
2. Mount chassis on wooden blocks. Keep all wires as short as possible.
3. Loop wires through holes, bend and make good mechanical contact for strength before soldering.
4. Lay tip of iron on point to be soldered. Touch with wire solder. Heat until it flows well between joints. Don't use excessive solder.
5. Make connections to points as follows:
   a) Socket lug No. 1 to first terminal of the electrolytic capacitor.
   b) Lug No. 2 to first terminal strip on tube socket mounting screw.
   c) Lug No. 3 to stator of variable capacitor and to top of coil.
   d) Lug No. 5 to rotor of variable capacitor and to bottom of coil.
   e) Lugs No. 6 and No. 7 together then to second terminal strip.
   f) Lug No. 8 to second terminal of electrolytic capacitor.
   g) Center terminal of coil to third terminal of electrolytic.
   h) Metal cover of electrolytic capacitor to first terminal strip.
   i) 5000 ohm filter resistor between 1st and 3rd electrolytic terminals.
   j) 22,000 ohm resistor between socket lugs No. 2 and No. 4.
   k) 560 ohm resistor between lug No. 8 and first terminal strip.
   l) .05 mfd. tubular capacitor between two terminal strips.
   m) One end of .01 mfd. to lug No. 2.
   n) Attach antenna wire to top terminal of coil.

III. Trial Operation of Oscillator

1. Procure 117L7 tube from stockroom. Check carefully.
2. Make trial test on electronic testing device on electronic bench, as follows.
3. Attach record player clips to .01 mfd. and tube lug No. 4. Instructor show how to do this.
4. Attach 110 volt clips to terminal strips above tube socket.
5. Insert tube. Plug into circuit breaker plug. *This is important.* If a wrong connection has been made the circuit breaker will throw and thus not damage any parts.
6. Turn rotor plates into stator plates of the trimmer ¾ of the way.
7. Tune radio around 1500 kc for reception. Start record player.
8. If no signal comes through, recheck carefully and try again.

IV. Mounting Parts in Cabinet

1. Your painted cabinet may be called for at the stockroom.
2. Mount chassis in cabinet with tube toward motor.
3. Mount motor on top first.
4. Mount switch, pickup, grommets, and rubber feet in cabinet.
5. Mount pickup rest with painted screw and nut.
6. Twist two motor leads parallel fashion and solder one to each terminal strip above tube socket.
7. Insert 110 volt cord through large grommet and tie knot for pull.
8. Solder one wire or cord to switch and the other to 2nd terminal strip.
9. Remaining switch terminal is connected to 1st terminal strip.
10. Insert antenna through small grommet. Tie knot also to take strain.
11. Fasten line cord and antenna down with metal strap to motor screw.
12. Parallel pickup leads and shorten to proper length.
13. Locate grounded lead and solder it to remaining terminal of .01 mfd.
14. Solder other pickup lead to lug No. 4 of tube socket.
15. Keep all wires on underside of chassis, or clamp down in some manner. Loose dangling wires *are not tolerated.*
16. Secure needle from instructor. Insert and operate unit again on test bench through the circuit breaker switch.
17. Trim oscillator trimmer capacitor to tune in at about 1500 kc.

Important. *Do not operate this unit on an outside antenna. This will increase its range to more than 100 feet which is prohibited by a federal regulation.*

COLOR BLOCK PRINTS FROM ONE BLOCK

WILLIAM S. RICE
Oakland, Calif.

Very interesting color block prints may be made from one block. This method is sometimes known as the Provincetown method because it was carried on in Provincetown, Mass., by several well-known artists there. The method, however, is not new since it has been practiced by a Japanese artist, Jackusha, with great success many years ago.

Either wood or linoleum blocks may be used successfully; the method of printing, however, differs somewhat. For water colors wood blocks should be used but for linoleum blocks, inks with an oil base are most suitable. Oil inks can be used on the wood blocks as well, but water colors do not work well on linoleum blocks. Therein lies the difference. Linoleum is easier to cut than wood because it has no grain to bother with. Wood blocks produce a certain grain in the print. That to some workers is very desirable. Woods that work well are basswood or sugar pine. They may be cut effectively with razor blades. Linoleum may be cut with V-shaped gouges that dig a trench around the color areas, giving them a postlike or decorative effect.

The earliest method known of coloring block prints was to make proofs of dark outlines, and to fill in the white spaces by hand with water colors. But today all methods of color printing require that the colors be applied to the print, not by hand, but by making the impressions upon the paper, one by one, until the picture is complete.

A suitable subject having been chosen, a landscape, bird, flower, or figure, the subject is penciled to the desired size, on manila or typing paper. The design is made so that the various portions are separated by a narrow white outline. The study should be treated strictly as a design, and the background spaces kept in pleasant relation to the subject in the composition.

Next lay a sheet of tracing paper on the design and ink the outlines with a speedball pen, or a soft lead or crayon pencil may serve as a substitute. Rule a ¼-in. border space around the edge of the wood block, which may be sugar pine or three-ply wood, and then trace the design. After the design is traced by rubbing on the reverse side with a soft pencil or charcoal, the cutting may begin. Do not use carbon paper for this job because it would inter-

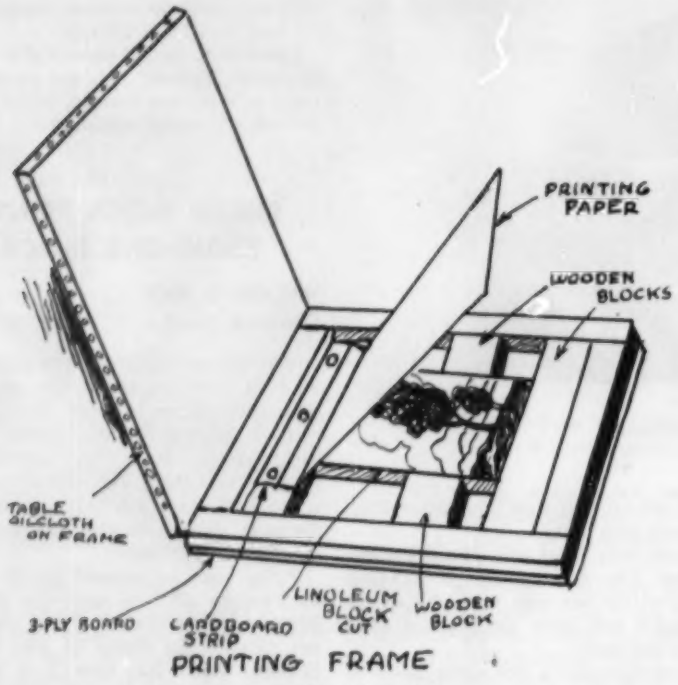


Fig. 1

fere seriously with the water colors used.

To cut a wood block, a single edged razor blade is very good and does the job neatly. A V-shaped groove, or trough is cut along the outline and the material carefully removed from the groove. This groove may be about 1/16 in. in width; but it may vary in places where accents or larger white areas are needed.

Let the block be about 2 in. longer than the design so that the printing paper may be thumbtacked to it and lifted whenever necessary to take a peek and see how the work is progressing.

After damping the block with a wet sponge or a soft cloth, it is ready to use. Fasten the paper securely to the block with thumbtacks. Three or four are all that are necessary.

Now lay the paper — Japanese Hosho paper works best and has a certain artistic quality not found in the cheaper papers — smoothly on the block and run the hand all around it, forming a crease that will register accurately each time the paper is lifted and put back in place.

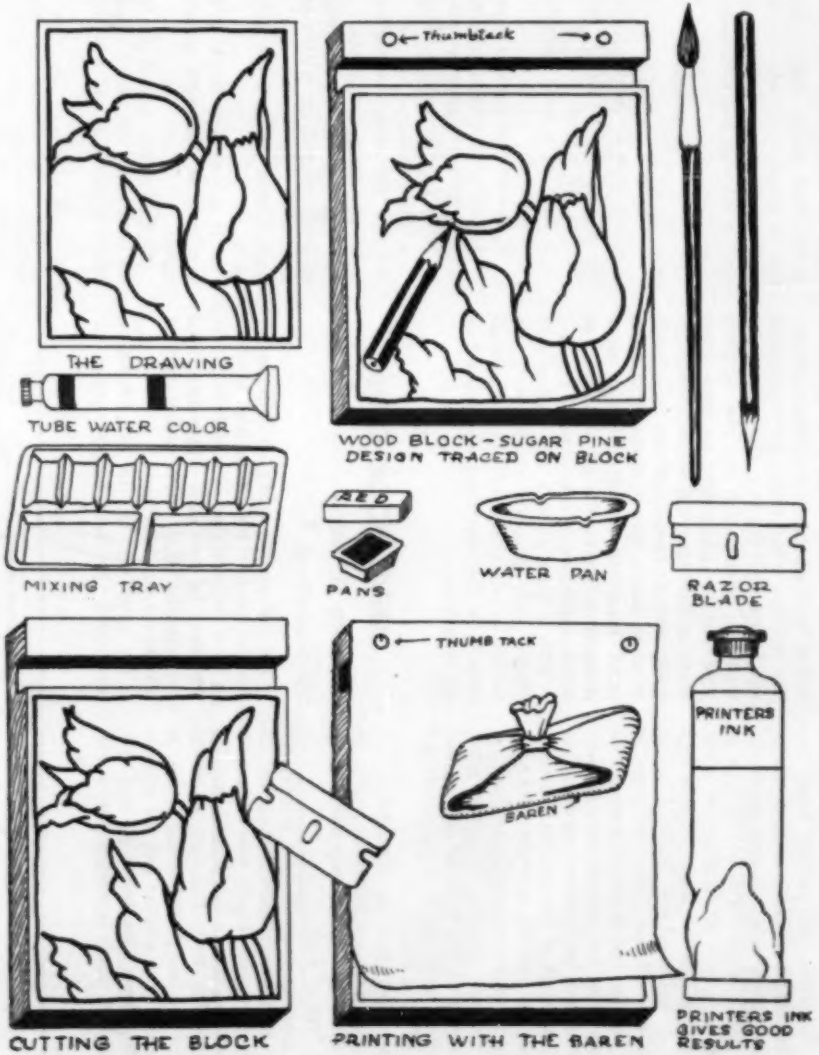
If you prefer to use a printing frame as shown in Figure 1, the extra extension on the block will not be necessary.

Creasing the paper forms a perfect keying and allows a critical study to be made of the print while it is being made. Water colors are next painted on the block on a small area and the paper is rubbed on the back with a burnisher. A glass or metal caster cup serves admirably. The paper is then lifted and another spot painted and so on until you have covered the whole ground. If your color prints too pale you should wait until it dries before strengthen-

(At left) Engraved block — one block method; (at right) finished print — one block method

MATERIALS FOR BLOCK PRINTS

COLOR PRINTING FROM ONE BLOCK



ing it; otherwise the printing paper becomes too wet and sometimes tears. Moreover, the result will lack that particular quality which is the charm of this type of printing.

If printing inks are used (oil base inks instead of water colors), linoleum blocks are the only choice. The inks may be diluted with a few drops of kerosene so that they may be applied with brushes. Rollers cannot be used for applying the inks to the block in the one-block method. Sable brushes both flat and round are quite suitable for oil or water-color methods.

For ordinary practice, newsprint paper works very well, but it should not be used for serious work as it deteriorates and turns yellow in time.

Hosho paper may be obtained at art stores or at Japanese stationery stores. It is not expensive and is most satisfactory for this type of work.

The printing frame is very satisfactory for use in the one-block method. It can be made by anyone handy with tools. You will need two frames and a flat board for the bed of the press. Three-ply wood will serve for the latter. One of the frames is nailed down on the board and the other is hinged to them. This one is covered with table oilcloth which is stretched on it and tacked to it similar to an artist's canvas. The linoleum block should be mounted on wood (type high $\frac{15}{16}$ in.). The wood blocks should be equally high and held in place with blocks and wedges to hold them firmly so that they will not slip. The burnisher may be used to rub on the oilcloth so as to insure that it does not tear the paper. Sometimes a sheet of tracing paper is handy to lay on the paper in order to avoid tearing the Hosho paper.

With a little practice the student may obtain some beautiful results with this method — prints that will frame up handsomely for the adornment of the home or the schoolroom.

ANVIL BOOK ENDS

RICHARD M. BIRCH

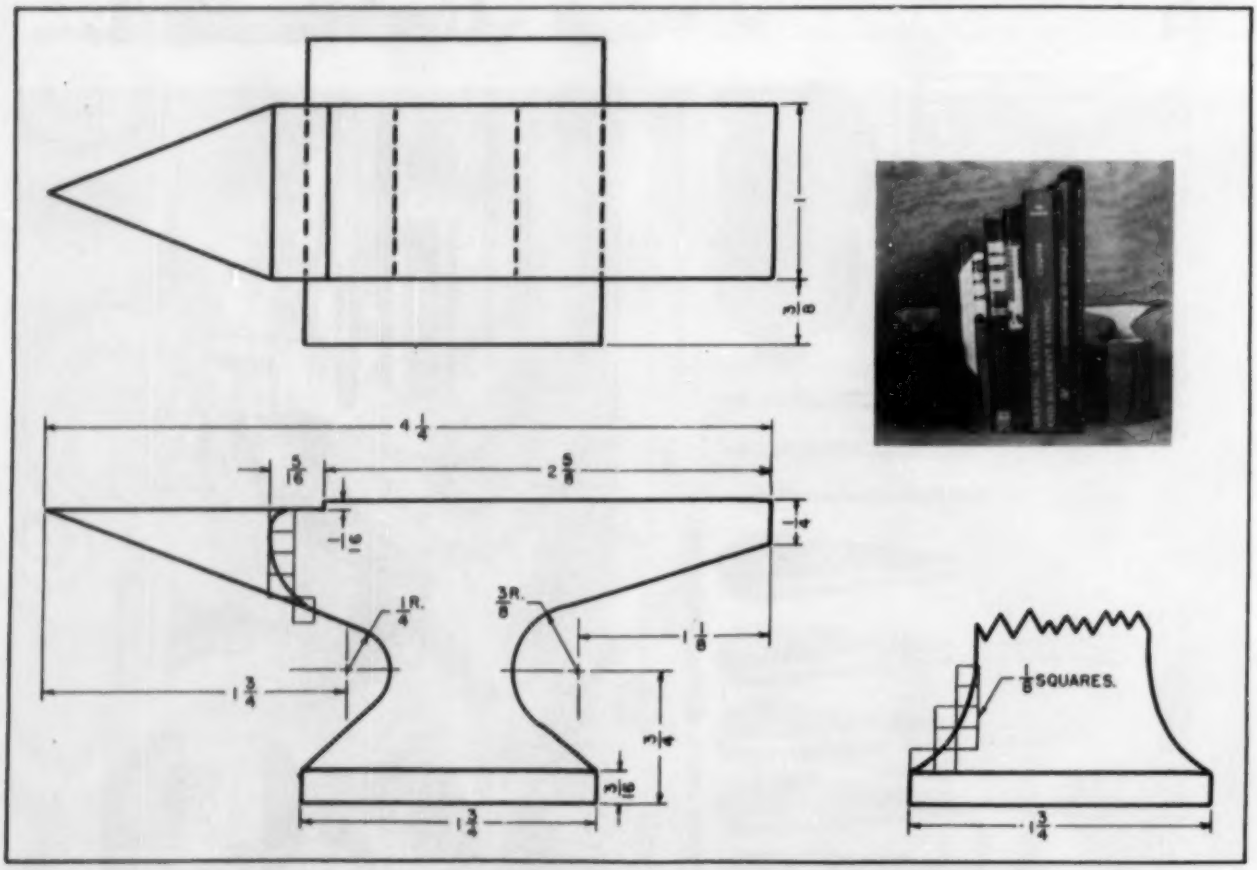
Mechanicsburg, Pa.

The cast anvil is used as an introductory foundry project for junior high students to show the principles of sand casting. The anvil may be used as a paperweight or as an ornament. With some modifications it may be used as book ends.

The anvil was cast in lead because it was found that lead would support the books much better than a lighter metal. For an ornamental job or for use as a paperweight, the anvil was cast from old zinc jar lids that had been melted.

Procedure

1. Make a two-piece pattern of the anvil according to the dimensions shown in the illustration. Be sure to have a slight draft on the pattern.
2. Ram up a mold, using the pattern you have made.
3. Remove the pattern from the mold.
4. Cut a gate from the base of the anvil to the sprue hole.
5. Replace the cope and drag.
6. Melt the lead or zinc in a ladle and pour the mold. Pour in enough metal to fill the sprue completely.
7. After the casting has solidified, break up the mold and cut off the sprue with a hack saw.
8. File off any flash the anvil may have on it.
9. If a very fine finish is desired, the anvil may be filed very smooth and then buffed.
10. Cut a tree branch for the base of the book ends. The branch should be about 3½ in. in diameter and 4 in. long.



Detail drawing of the anvil book ends and a view of the book ends in use

11. Sand only the rough spots from the branch.

12. Apply a finish of your choice to the branch.

13. Glue a piece of felt to the base of the *stump*.

14. Drill four 1/10-in. holes in the corners of the anvil base.

15. Place the anvil on top of the stump and line up the back of the anvil with the edge of the stump.

16. Attach the anvil to the top of the stump with brass nails.

You are bound to come across seed pods of various kinds in your outdoor trips. They will make fine decorations for floral arrangements if you dip them in fresh, white shellac that has been thinned. When dry, dip once more for added beauty and protection. — *Shellac Information Bureau.*

TOOLING AND FORMING ALUMINUM TRAYS

DICK HUTCHINSON

San Gabriel, Calif.

Soft sheet aluminum is very flexible, and therefore provides a material out of which the craftsman, and particularly the beginner, may easily turn out, by hand, a

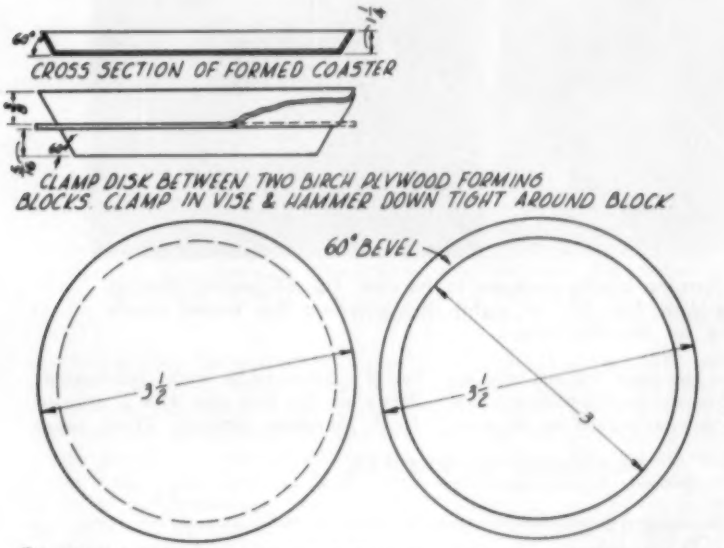

CROSS SECTION OF FORMED COASTER
CLAMP DISK BETWEEN TWO BIRCH PLYWOOD FORMING BLOCKS. CLAMP IN VISE & HAMMER DOWN TIGHT AROUND BLOCK
60° BEVEL
3 1/2
3 1/2
3

FIG. 1 20-GA ALUMINUM DISK FOR COASTER. PLYWOOD FORMING BLOCK

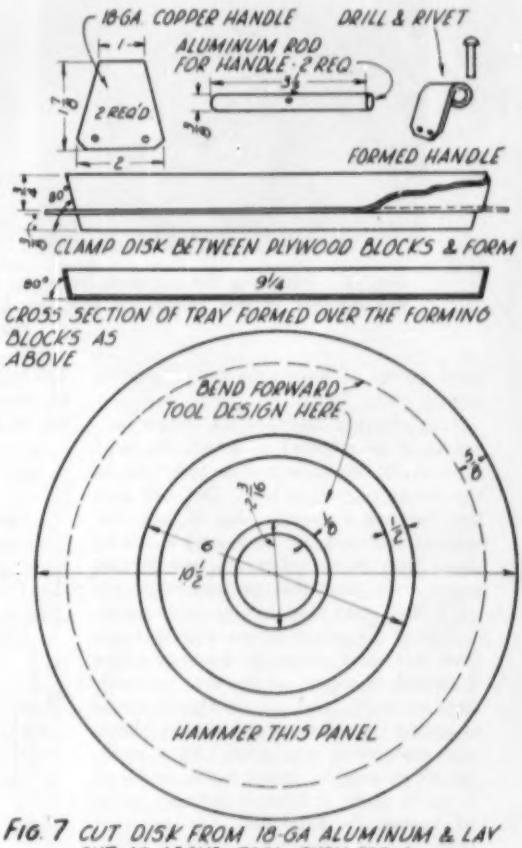


FIG. 7 CUT DISK FROM 18-GA ALUMINUM & LAY OUT AS ABOVE, TOOL, THEN FORM

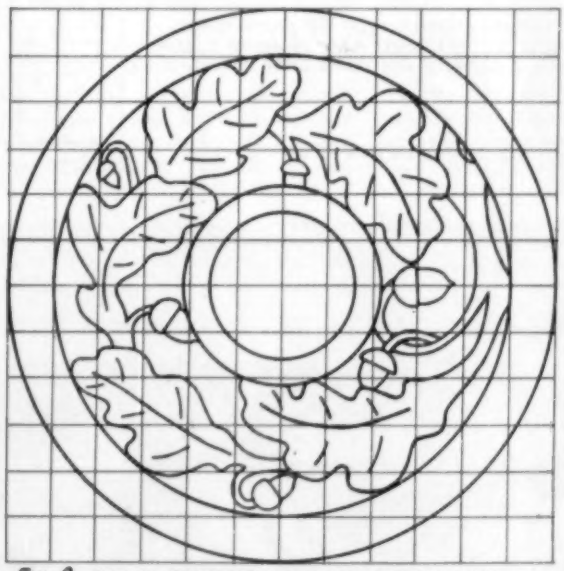


FIG. 9 DESIGN FOR CENTER OF TRAY. CUT ALL LINES IN WITH CHASING TOOL. DECORATE LEAVES WITH HALF BALL TOOL, & WORK OVER BACKGROUND WITH PANELING TOOL

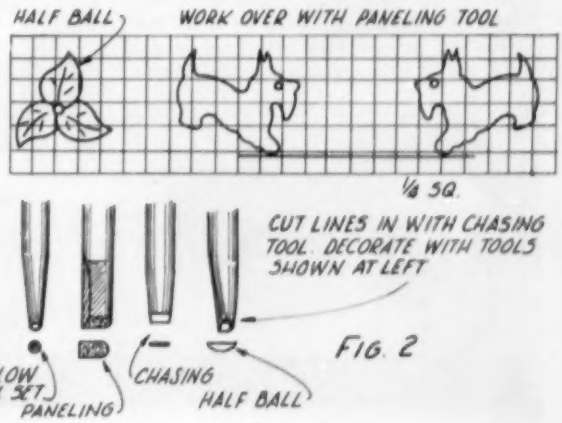


FIG. 2

Tooling and forming aluminum trays

Fig. 3. Forming the coasters between two forming blocks, clamped in the vise. Fig. 10 (center) Tooling the design in the center of the snack tray disk. Fig. 11 (at right) Straightening the tooled snack tray disk on the slip rollers

great variety of interesting and decorative pieces.

The following describes the simple procedure to be followed to obtain the most satisfactory results in tooling and forming the pieces illustrated here. This will give the beginner a general idea of how the work is done and, we hope, enable him to go on from there, and design, and develop many more ideas that he may work out for himself with this very versatile metal.

Any of the pieces shown may be made from soft sheet copper of the same gauge if desired. However, copper does not work quite so readily, particularly when it comes to raising the sides to form a tray. Aluminum compresses very easily. As a result, the sides may be raised to a depth of 5/8 in. or more, if handled skillfully, without having the metal kink. On the other hand, to raise copper to a depth of 5/8 in., it will be necessary, during the raising process, to remove the metal from the forming blocks from time to time and straighten out the kinks, from the inside.

Begin with the coasters shown in Figure 1. The rim on this piece is raised only 1/4-in., so copper may be used if preferred. Cut out as many disks as needed for the number of coasters to be made, and hammer lightly on the face side with a rounded faced planishing hammer. These pieces

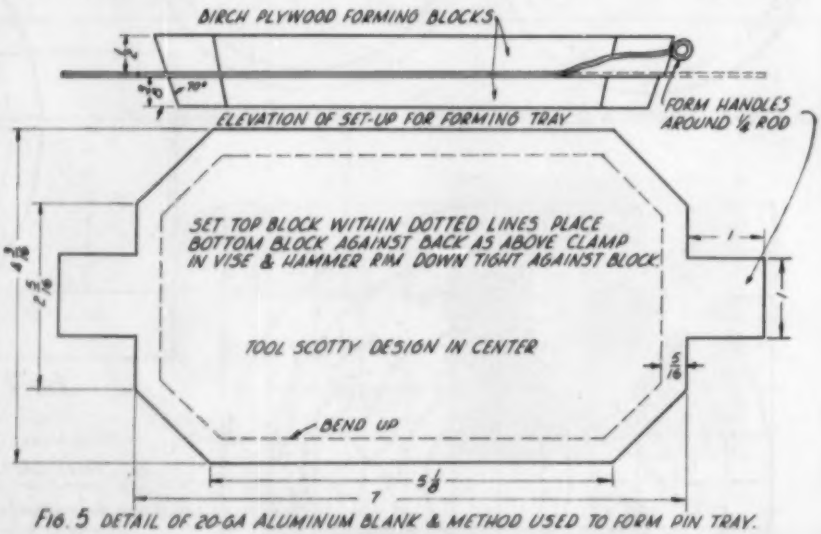

BIRCH PLYWOOD FORMING BLOCKS
70°
ELEVATION OF SET-UP FOR FORMING TRAY
FORM HANDLES AROUND 1/4 ROD
SET TOP BLOCK WITHIN DOTTED LINES PLACE BOTTOM BLOCK AGAINST BACK AS ABOVE CLAMP IN VISE & HAMMER RIM DOWN TIGHT AGAINST BLOCK
TOOL SCOTTY DESIGN IN CENTER
BEND UP
5 1/8
7

FIG. 5 DETAIL OF 20-GA ALUMINUM BLANK & METHOD USED TO FORM PIN TRAY.

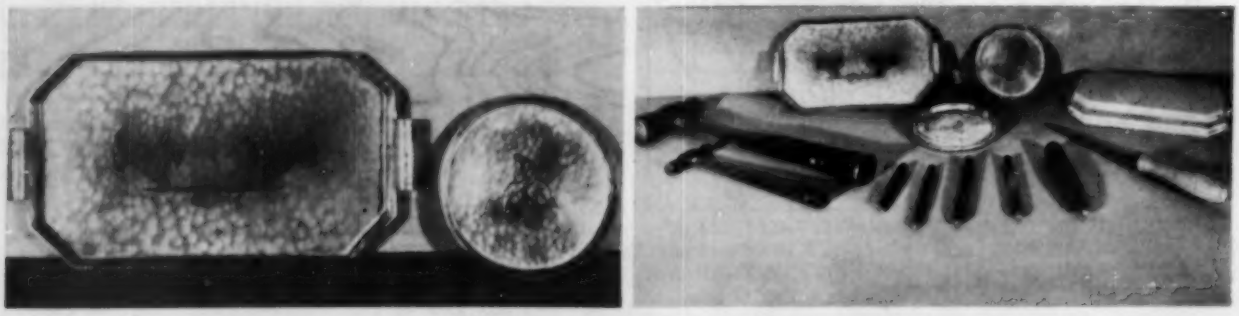


Fig. 4. The finished pin tray, and one of the tooled coasters. Fig. 6 (at right) The finished pin tray. Nested coasters. The forming blocks for the pin tray, and some of the tools used in making them

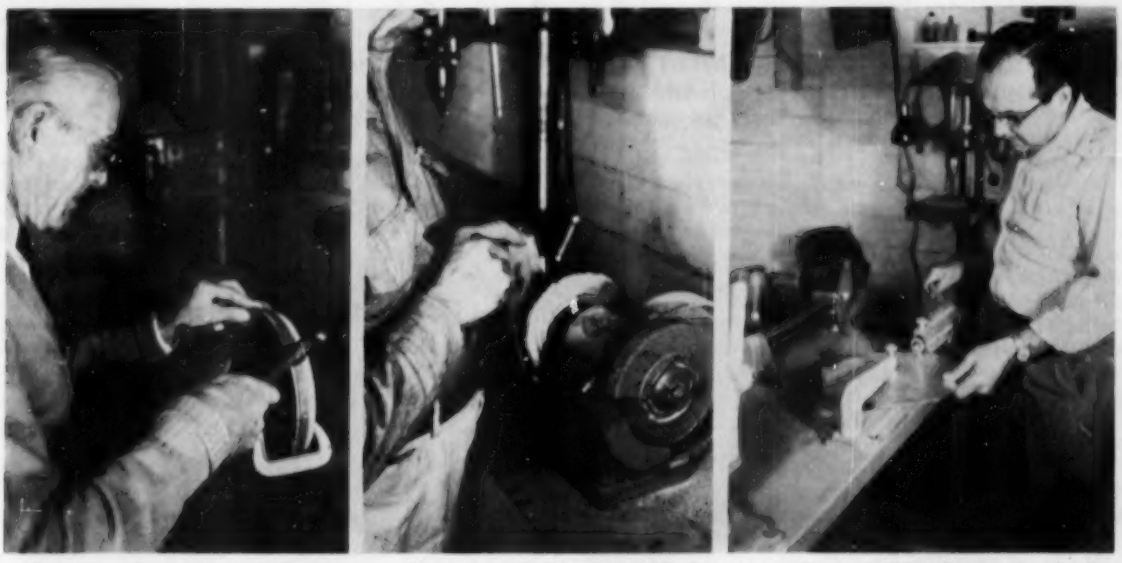


Fig. 12. Forming the snack tray between the forming blocks. Note the two "C" clamps applied for double security. Fig. 15 (center) Polishing the pin tray on a buffing wheel. Fig. 8 (at right) Cutting the 10½-in. aluminum disk for the snack tray, in the disk shear

may be left plain, and formed. Or, a motif may be tooled in the center of each tray.

The three leaf design shown in Figure 2 was used for our set of six coasters. Cut a template of thin cardboard and trace the design in the center of each tray. Then cut in all of the outline, and the veins in the leaves with the chasing tool, or with a small blunt cold chisel. Then using a half ball punch, work over the leaves to carry out the irregular leaf effect.

The two plywood forming blocks are sawed out on the jig saw. Tilt the saw to make a 60-deg. cut, and saw out. Then sand smooth. Or, they may be turned out on the lathe.

Place the disks, one at a time, between two hardwood blocks, and straighten out by striking the top block with a heavy hammer. Then clamp between the two forming blocks, and clamp the assembly in the vise and, using the hammer, carefully hammer the rim down tight against the block as in Figure 3. File the top rim smooth, and the coasters are finished, as in Figure 4. The finished coasters should nest together if they have been formed evenly.

The little tray detailed in Figure 5, may be made in any size desired. We made this one in a size suitable for a pin tray. Cut out the blank, and lay out as shown. Hammer over the face of the blank. Then outline and tool in the two Scotties design in the center. See Figure 2. These are outlined with the chasing tool. The eyes are set in with the hollow end nail set. Then the two dogs are worked over with the paneling tool, Figure 2, to represent hair, and the foundation line is touched up lightly with the same tool.

The plywood forming blocks for this piece may be cut out on the jig saw, or on the bench saw. In either case, tilt the saw to make a 70-deg. cut. Sand smooth before using. Any number of pieces may be formed over a single set of forming blocks. The forming blocks, along with some of the tools are shown in Figure 6.

Straighten the piece between the two hardwood blocks. Then set up between the forming blocks. Clamp in the vise, and form, as before. This done, bend the two handles back, and around a length of ¼-in. steel rod. See the finished piece in Figure 4. File the rim even.

One of the most attractive pieces we have developed in a long time is the snack tray detailed in Figure 7, and, although we used some of the metalworking equipment for making our tray, the work can all be done by hand.

Lay out the 10½-in. disk on 18-gauge

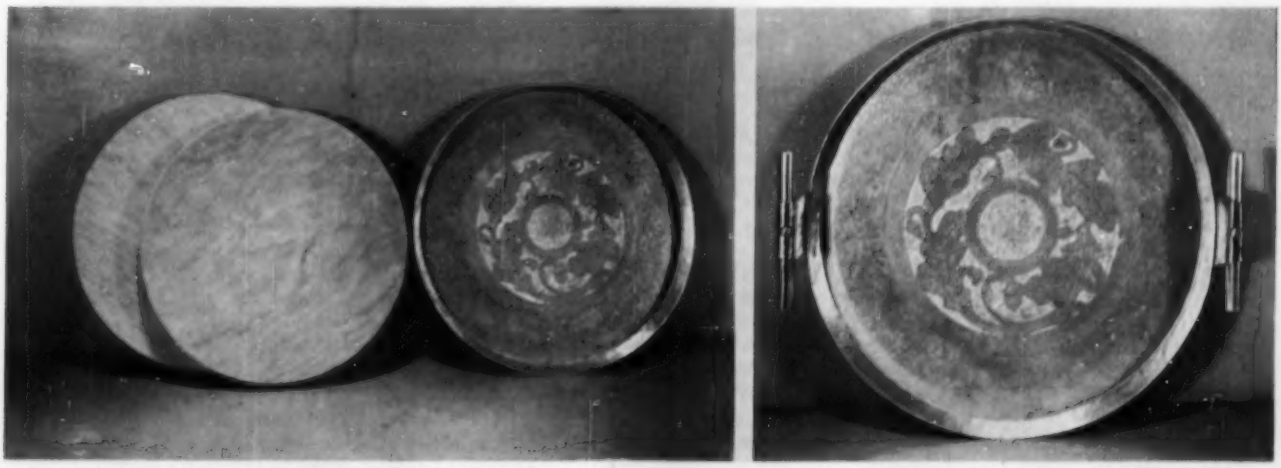


Fig. 13. The snack tray, and the plywood blocks over which it was formed. Fig. 14 (at right). The hand tooling, and the contrasting copper handles make this a beautiful snack tray

soft sheet aluminum, and cut out, either on the disk shear, as shown in Figure 8, or by hand, with the tin shears.

It is difficult to trace a design on aluminum, as carbon paper tracings will not show. To overcome this, paint the surface of the metal over with a thin coat of flat white oil paint and let dry, after which the carbon lines will show up as well as on paper.

Trace the design in Figure 9, in the center of the disk and, using the compass describe the circles, as shown. Then, using the chasing tool, cut in all of the outlines, including the circles. Work over the leaves with the half ball tool. Then do the background with the paneling tool as in Figure 10. Then, using the rounded faced hammer, hammer over gently outside the circle to the edge. All tooling, and hammering should be made just heavy enough to make the impression, and not expand the metal more than is necessary. To do so would make it more difficult to straighten the work out before forming.

If a slip roller is available, let the rear roller down as far as possible. Then run the piece through the front rollers several times, from different angles. See Figure 11. This will straighten the piece out flat and even. If the rolls are not at hand, straighten between the hardwood blocks, as before.

Saw out the two plywood forming blocks, and if necessary, true them up on the lathe. Place the piece between the blocks. Clamp in the vise, and, this piece being so large, it will be well to clamp together tight with two "C" clamps at the top. See Figure 12. Gently hammer the ½-in. rim down tight against the block. The formed tray, and the two forming blocks are shown in Figure 13.

Cut the two 18-gauge copper handle ears, as shown, and hammer one side. Then cut two pieces of 3/16-in. aluminum rod 3½ in. long. Bend the tops of the ears around the aluminum rod handles. Drill in the center, as shown, and rivet with 1/16-in., r. h. aluminum rivets. Bend the lower end of the ears to fit tight around the contour of the sides of the tray. Buff both of the completed handles to a high polish on a buffing wheel. Drill holes, as indicated, and rivet the handles, one on either side of the tray, with 1/16-in. r.h. aluminum rivets, as shown in Figure 14.

The natural silvery finish on aluminum is very pleasing. If the metal becomes marred, or discolored, the silvery finish may be restored by wetting a soft cloth and dipping it into fine emery dust. Then, using a rotary motion, rub it over the metal surface, if a high polish is desired. Polish on a power buffing wheel, as in Figure 15.

Big four-engined planes can take over 5000 gallons of gasoline at a fueling, and burn it up at a rate of 600 gallons an hour. — *Petroleum Newsnotes.*

KNOT HOLE AWARD

WARREN F. EISETH
High School
Gillett, Wis.

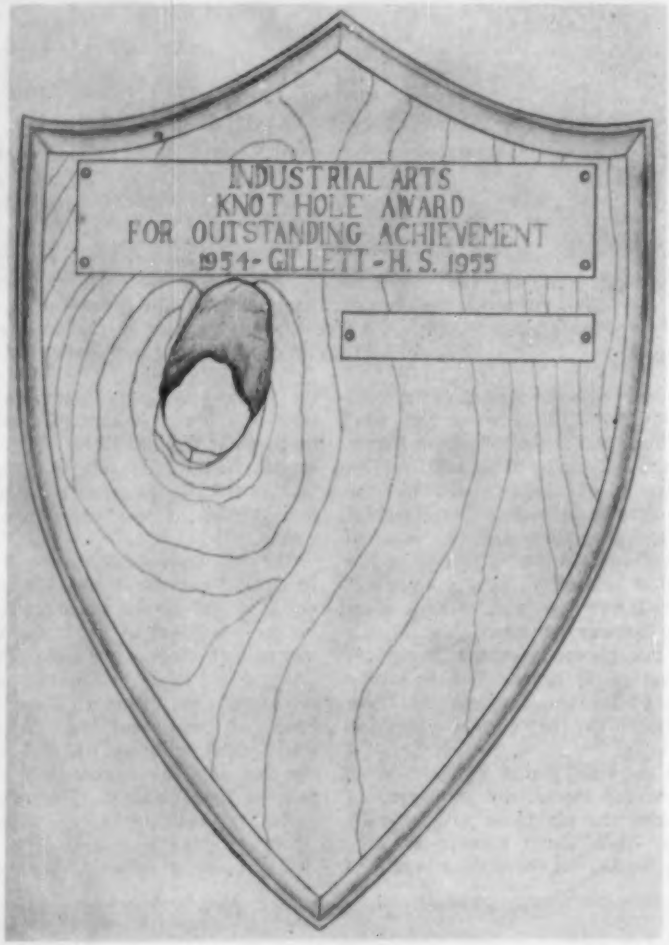
Does your school sponsor an award day program at the end of the school year? Do any industrial-arts teachers participate? The answer would be *yes* if you were an athletic, band, debate, or forensics coach. Why don't you get into the act as shop teachers? It's fun!

Here is the way I did it. At the beginning of the school year 1953–54, I developed an award which I called the "Knot Hole Award." The award consists of a 6¼ by 9-in. beautifully finished plaque with engraved brass plates. The enclosed sketch illustrates the plaque. The small brass plate is for the boy's name. The large plate is inscribed as follows:

INDUSTRIAL ARTS
KNOT HOLE AWARD
FOR OUTSTANDING ACHIEVEMENT
1954 — GILLETT H. S. — 1955

The award should be reserved for outstanding students. This makes the award a more coveted prize. During the 1953–54 school year, I presented three awards to outstanding senior boys. One of the boys was also a Ford Motor Company industrial-arts awards winner. This year I felt that only one student deserved the award. There may be a year when no student is worthy of one.

The name "Knot Hole Award" suggests humor which is fine. Everyone enjoys a bit of humor, and it definitely makes your award unique especially with a knot hole right through it. This humor angle gives you speech material for a fine presentation. However, the humor is short-lived because of the fine manner in which your plaque has been made and beautifully finished by you.



Knot hole award plaque

A complete explanation as to how the award can be acquired is given to all my students of industrial arts at the beginning of the school year. One award is made and placed in the school shop to stimulate better work.

The brass plates may be engraved for about five cents per letter. My superin-

tendent is very enthusiastic about this venture and goes along with the engraving charge. I am sure yours will chalk it off as good public relations, too.

The other areas of industrial arts may create a similar award. It may bear a name more suited to the type of work involved. For example *Inkspot* for printing. Whatever the award, be sure it is one of which you will be proud.

Keep the recipients' names secret until the moment of presentation. This build-up is a fine experience for you and for your student.

This project has certainly been well worth the effort in my department. I am sure it will be in yours.

MAKING PROJECTS OUT OF SCRAPS

FRED G. FOGG
Walter J. Helms School
San Pablo, Calif.

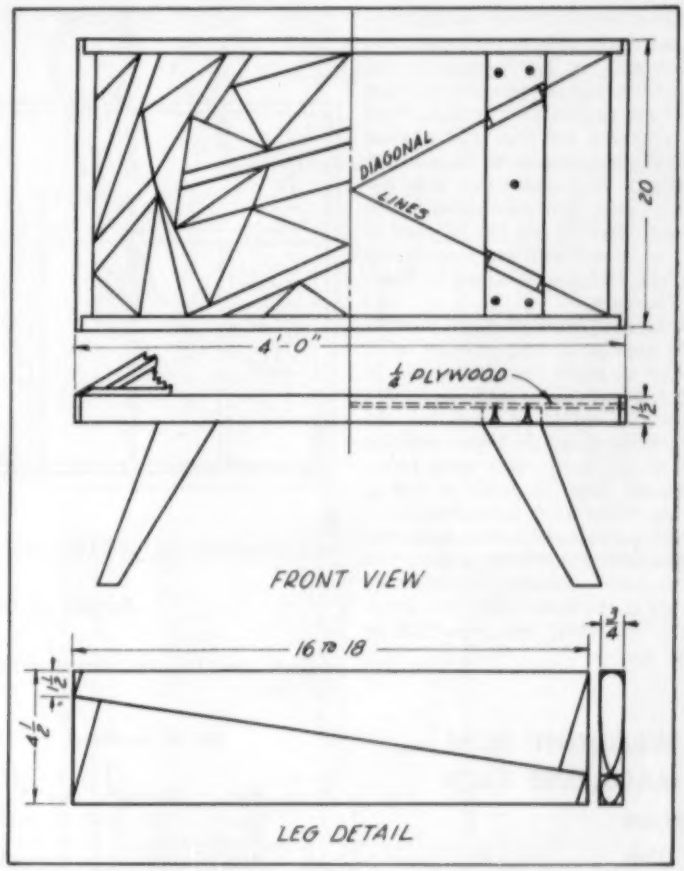
While burning scraps in the school incincerator one afternoon it occurred to me that a use could be found for the hardwood I was throwing away, possibly a scrap lamp or other project. I saved the best three quarter inch pieces, and immediately started to test my idea. From this mushroomed the idea for scrap bowls and coffee tables. It wasn't long before scrap lumber became very scarce, and to some extent new lumber was used.

I made a model lamp and a teaching aid to accompany it, so that it was only necessary to point my finger in that direction when I was asked: "What size — — ?" etc. The procedure is better explained in the drawings than in words. The pattern variation with this type lamp was unlimited, as I was soon to discover, and to some degree this could be used to fit any particular student's skill. Once the sides were glued a block plane was used to remove any variation in thickness before sawing on the hand saw or table saw in preparation for gluing this half to the piece for the opposite side. This was repeated on the other side, as well as the top. A belt sander was then used to even up all sides preparatory to the final hand sanding. Any cracks or holes were then filled and sanded before the desired finish of shellac, varnish, lacquer, or wax was applied. Another variation of this hardwood scrap lamp started when one student started cutting up scrap plywood and gluing it on in various designs.

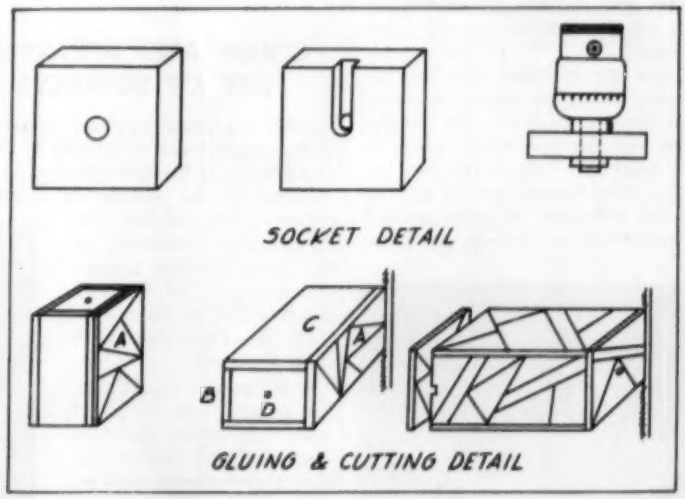
The coffee table and lathe project worked out much the same as the lamp made out of scrap lumber. Here again, the variations

Projects made out of scraps

Students shown are Robert Hall at left, and Denyil Norolt



Coffee table made out of scraps

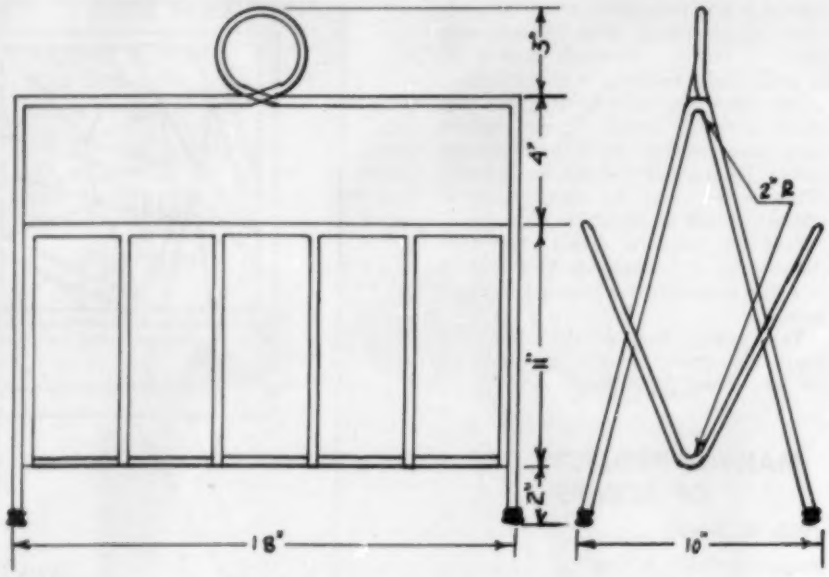


Lamp made out of scraps

some students innovated were very gratifying. I found it wise to limit the coffee table projects to only the better students who had proved they had the necessary patience and skill to complete such a project. Occasionally a student ran into trouble while gluing up the many pieces, as the glue had a tendency to warp pieces that were not held down. Gluing large sections at a time proved best. Once the top was all glued in place it was planed and then sanded with a power belt sander and finished by hand, as with the lamp.

The lathe scrap bowls were put together much the same as the lamps and the coffee tables, with an added caution that the fit and glue jobs were of far more importance than before. It should be noted that the more simple the design the better, avoiding the use of too many very small pieces which distract from the design as well as making the fitting much more difficult.

Both the students and parents have been very enthusiastic about these projects, and they have been displayed in a place of prominence in the home. They are useful, decorative, and novel, and never fail to catch the eye.



Details of round iron magazine rack

WROUGHT IRON MAGAZINE RACK

NED FRISBIE
Bryan, Ohio

This magazine rack is an excellent project for the beginner in welding. It also is a pleasing addition to any room in the house.

All pieces are pre-bent with the use of a bending jig before welding together. Weld the five bottom V's to the straight tops, then weld the two ends in place. If need be, bend the ends in, so the top handle fits. The bottom spacers can be used or not depending on your personal taste. The bottoms on the legs are ¼-in. rubber cane tips to prevent scratching the floor.

Round iron magazine basket

BILL OF MATERIALS

No. of Pieces	*Part*	*Material*	*Size*
2	Tops	CRS	¼ in. dia. by 18 in.
1	Handle	CRS	¼ in. dia. by 30 in.
2	Ends	CRS	¼ in. dia. by 34 in.
5	Bottom	CRS	¼ in. dia. by 24 in.
4	Spacers	CRS	¼ in. dia. by 4¼ in.

COLOR AND APPARENT SIZE OF SURFACES

Color can cause increases or decreases in the apparent size of surfaces by at least 13.5 per cent it has been conclusively demonstrated in the findings of a research project conducted by the Psychological Laboratory of the Johns Hopkins University Institute for Cooperative Research in collaboration with the Pittsburgh Plate Glass Company.

In the project, people ranging in age from 14 to 55 years were used as observers. They included skilled, unskilled, and clerical workers, university and secondary school students, and housewives. Only observers with normal visual acuity and color vision were used.

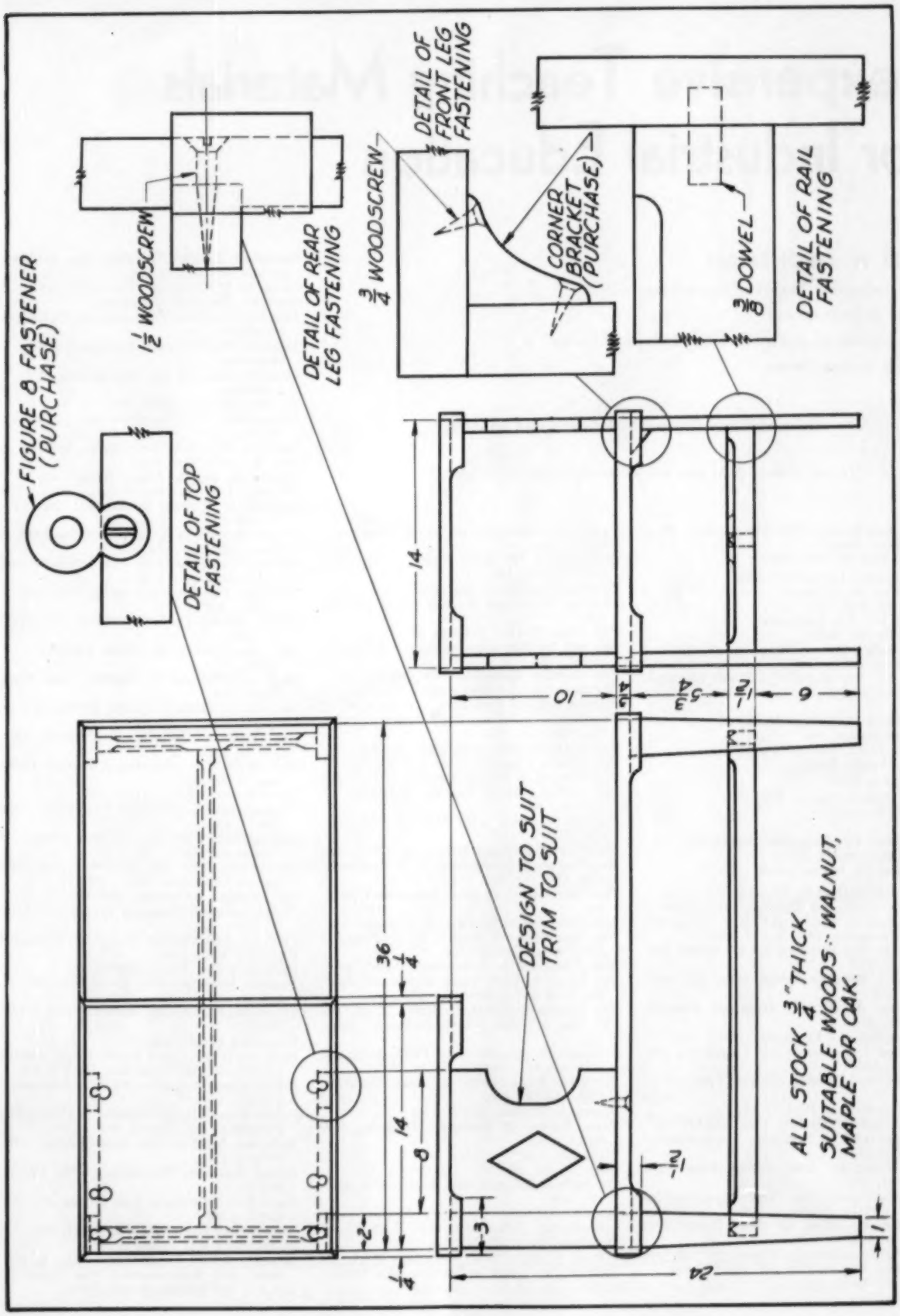
It was found that the longer the wave length of a colored surface, the higher its value, and the greater its chroma, the larger it will appear.

It was found that hue — the quality that distinguishes one color from another such as red from blue — changes alone can affect at least a 9.5 per cent change in the apparent size of a surface. Brightness or value changes alone can bring about at least an 8.5 per cent change in apparent size, while chroma or saturation changes alone can affect apparent size by at least 6 per cent.

A combination of the three basic color dimensions producing an effect in the same direction can cause an increase in apparent size of at least 13.5 per cent.

An Army National Guardsman receives approximately one-sixth of the annual base pay of a soldier for taking part in one drill a week and 15 days summer camp each year. — *Information Section, Wisconsin Military District.*

Lamp table by Louis Barocci, Cudahy High School, Cudahy, Wis.



Details of lamp table by Louis Barocci, Cudahy High School, Cudahy, Wis.

Inexpensive Teaching Materials For Industrial Education

CHRIS H. GRONEMAN
Head, Industrial Education Department
School of Engineering
The Agricultural and Mechanical College of Texas
College Station, Texas

Industrial and General — Bulletins and Booklets

(*Continued from page 44A of the September, 1955, issue*)

National Board of Fire Underwriters, The
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New York 38, New York

Fire Insurance Facts and Trends
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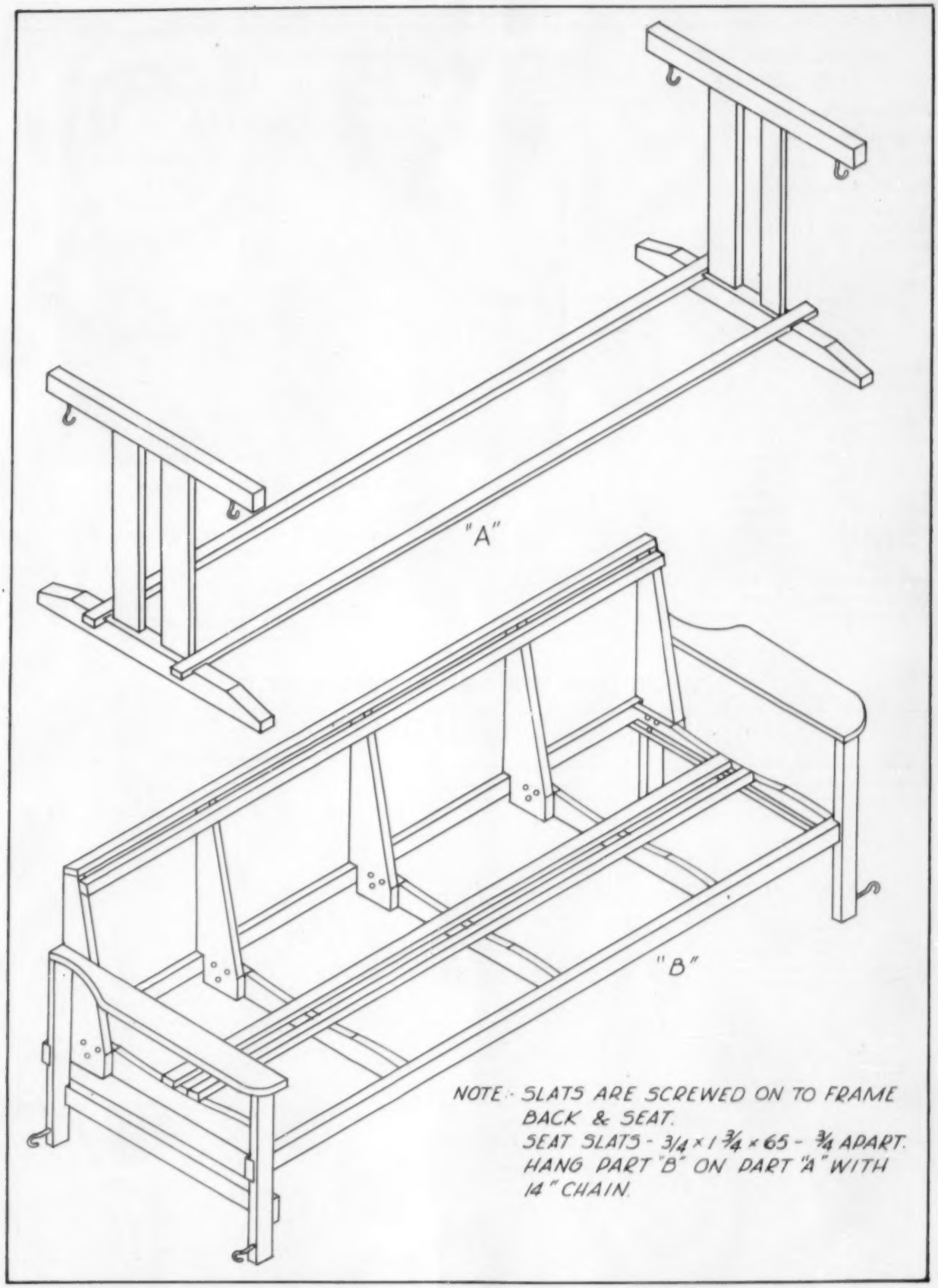
(Continued on page 22A)



Detail drawing of a gliding swing by John S. Triantafelow, student, vocational department at Bethlehem High School, Bethlehem, Pa.

WORK BANK FOR TYPE CABINET

NICHOLAS D. GERMANO
Graphic-Arts Instructor
Balboa High School
San Francisco, Calif.

The teacher of graphic arts can make the distribution of type much easier for his students by constructing a small *work bank* that can be attached to the side of the type cabinet. Many school print shops do not have slanted work banks for the students. Without this necessary work area the student must place his galley on the type case during the process of type distribution. This method of distribution is cumbersome and irritating to the student as well as inefficient, because he is constantly moving his galley from side to side in order to uncover the type boxes before he can drop the type into them. For example, if the galley is placed over the bottom of the capital section of the case, the student must push the galley to the left before he can distribute any of the capital letters covered by the galley. When he distributes lower-case letters he must push his galley to the right in order to expose the lower-case boxes.

This process of pushing the galley from side to side can be avoided by constructing the work bank shown in Figures 1 and 2. The placement of the galley on this work bank will not only make the student's work easier but will provide more logical procedures and orderliness in his work. The work bank will also develop a better sense of organization.

The work bank shown may be modified to suit the various styles of type cabinets. It can also be constructed of metal to suit metal type cabinets if desired.

Fig. 1. Work bank attached to type cabinet

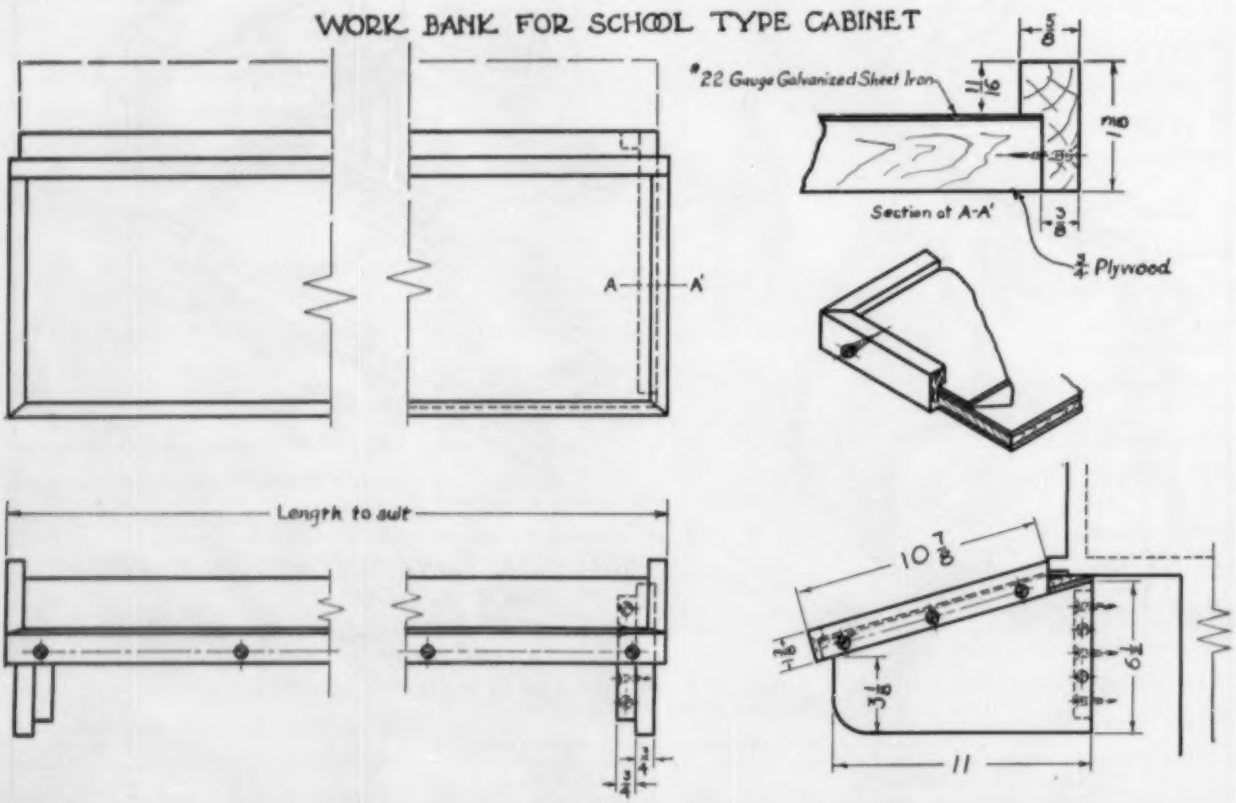


Fig. 2. Details of the work bank by Nicholas D. Germano

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Recent surveys tell us two things: 1. The majority of shop instructors want industry-type machine tools for student training.
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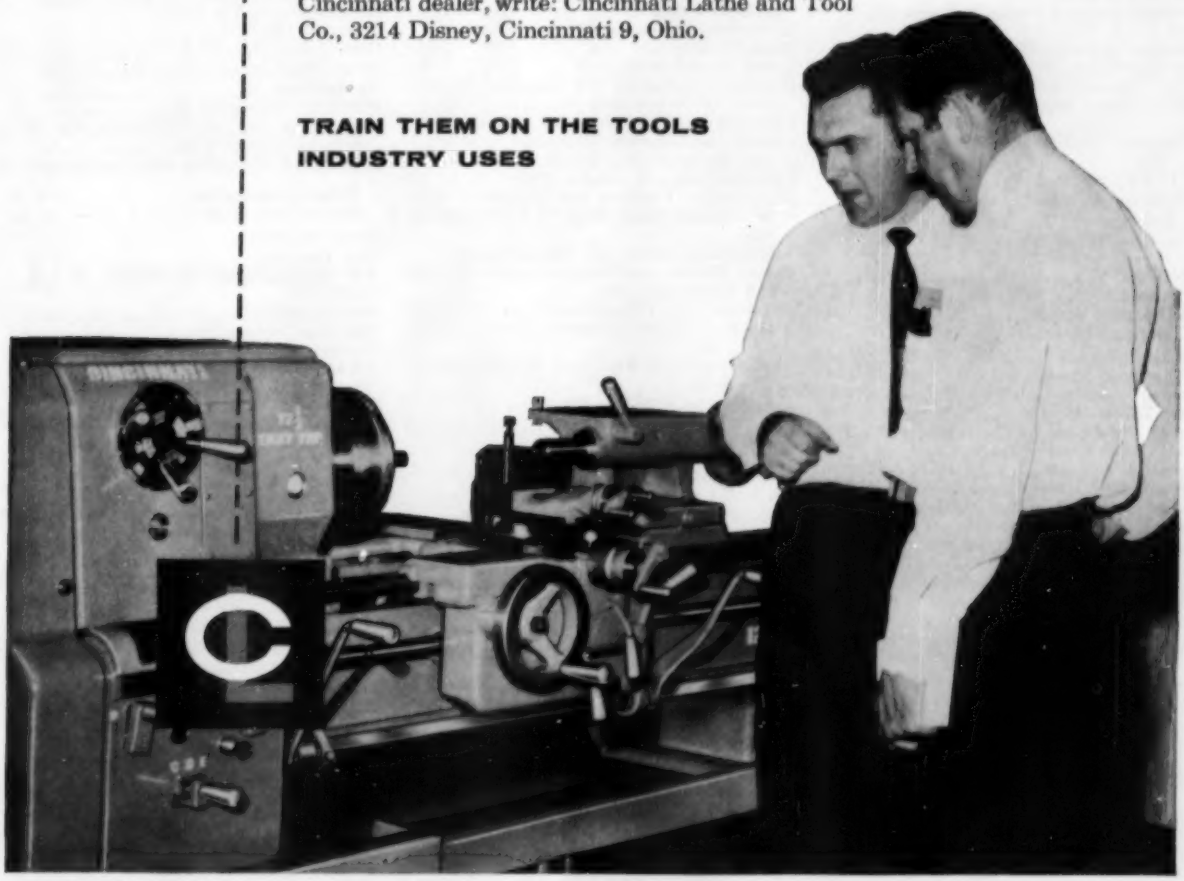

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(Continued from page 282)

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(Continued on page 25A)

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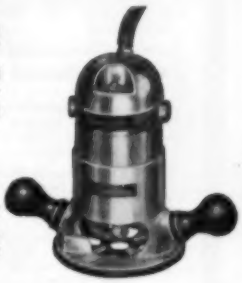

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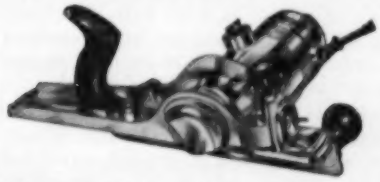

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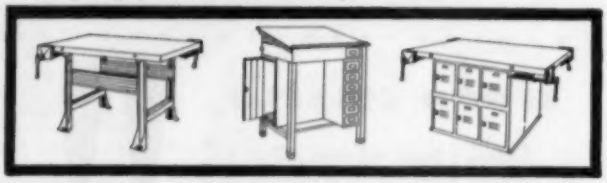

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(Continued from page 22A)

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Knoxville, Tennessee

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Agricultural Department
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Houston 2, Texas

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Sulphur Its Occurrence and Uses

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Hartford 15, Conn.

Safety Booklet, (Auto Accident Statistics and Analysis; revised annually)
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You are Safer than You Know
2 Safety Films

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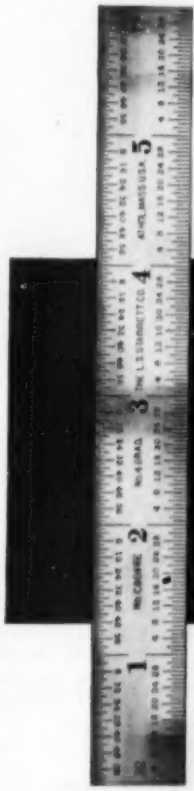
National Income, 1954 Edition
Regional Trends in the U. S. Economy, $1.00
Retailing:
Guide to Government Information on Retailing, 20¢
Retail Policies — Their Selection and Application, 25¢

(Continued on next page)



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Design Criteria for Wood Frame Walls, Housing Research, Fall 1951 — "Techniques for Home Construction," O-T-27, 30¢
Design Criteria for Space in Dwellings, Partially reported in Housing Research, O-T-37, 30¢, Oct. 1952, "What People Want When They Buy a House" and
Housing Research, Spring 1952, "Will Science Plan the Home of Tomorrow?" (Note: For complete report see "Available in manuscript form from Library,") 30¢
Housing Materials Use Survey, "The materials Use Survey," O-E-76, 30¢
Sales Prices and Rentals of Newly Completed Dwellings, "New Housing in Metropolitan Areas," U. S. Dept. of Labor Bulletin #1115, 1-E-111, 35¢
Identification of Materials and Labor Savings in Wood Framing for Dwellings, Housing Research No. 6 — "Clear-Span Roof Trusses for One- and One-half Story Housing," 1-T-118, 35¢
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Wood Pulp — A Basic Fiber

U. S. Rubber Company
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New York 20, New York

Rubber, A Story of Romance and Science

Vermont Marble Company
Proctor, Vermont

The Origin and Uses of Vermont Marble

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Through Silken Sieve

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Combine — Sectional (Model "K-2")
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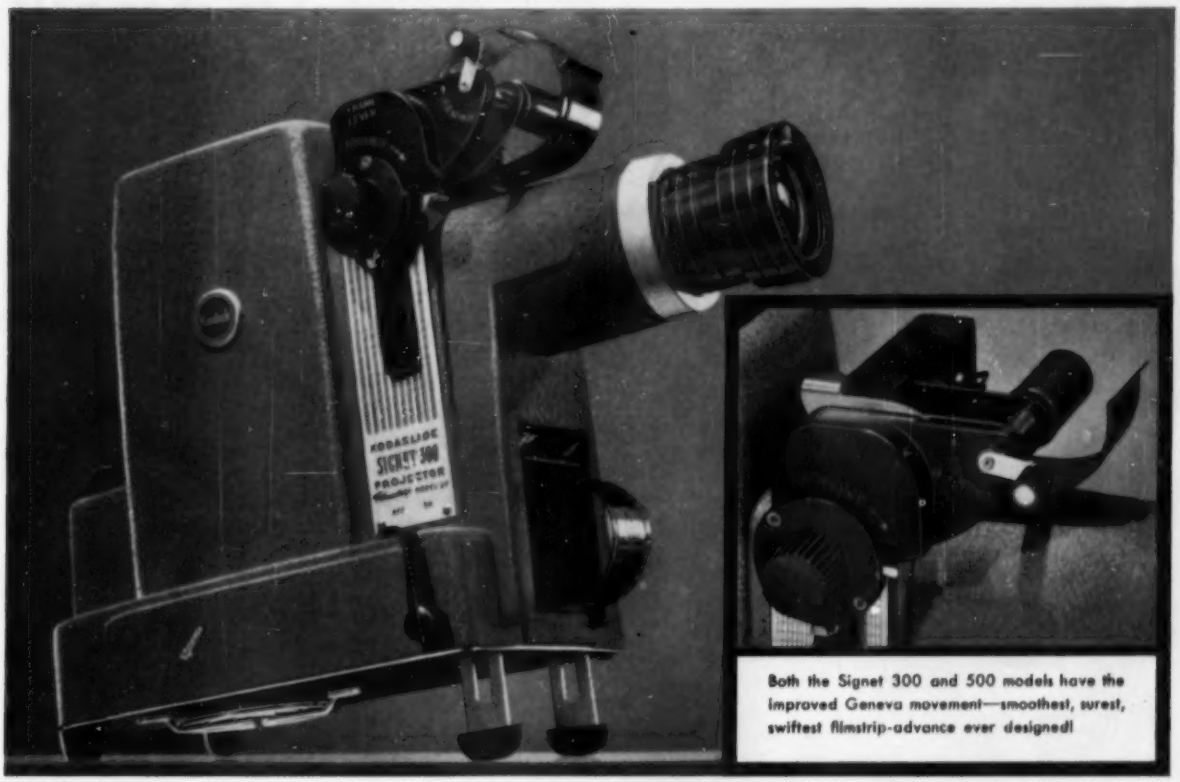
Power Take-Off Performance
Engine Sectional View (Model "D" illus. pg. 15)

(Continued on page 28A)



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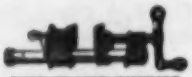
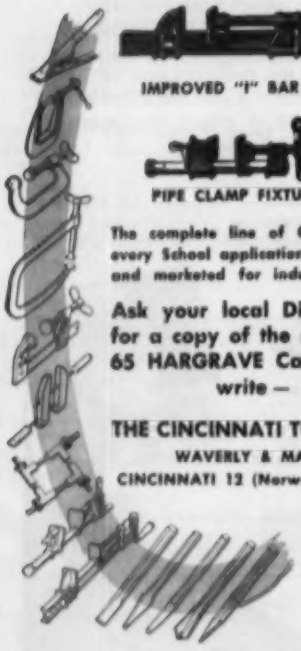


PIPE CLAMP FIXTURE



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TEACHING MATERIALS

(Continued from page 26A)

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Tractor Sectional View (Model "VAC")
Sawdust Sam (Safety Poster)
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One Equals Four (Pasture Management)

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Petroleum in the Home an Educational Display
Birth of An Oil Field, The Story of Drilling and Production
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Agricultural Department
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Houston 2, Texas

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Safety Ahoy, 15 minutes, color sound, 16mm.
Hook, Line and — Safety, 17 minutes, color, 16mm. sound
Partners in Production, 13 minutes, color, 16mm. sound
Friend or Foe, 15 minutes, black and white, 16mm. sound
Ladders, Scaffolds and Floor Openings, 9 minutes, color, 16mm. sound

(Continued on page 31A)

handy shop unit

Holds 13 Auger Bits
Sizes ¼" to 1"

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only $1.00 postpaid

A practical storage rack that helps teach system in the shop, protects and saves wood-boring tools. Made of durable steel, screws on in a jiffy! Bits are firmly held by Irwin's patented spring clips. Size markings shown for easy selection — ¼" to 1". Order an Irwin Hang-A-Bit Rack for your shop. Send $1.00 to Irwin, Dept. A, Wilmington, Ohio, today. Don't delay — quantity limited. Price includes rack only.

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13 Bits in Hardwood Chest
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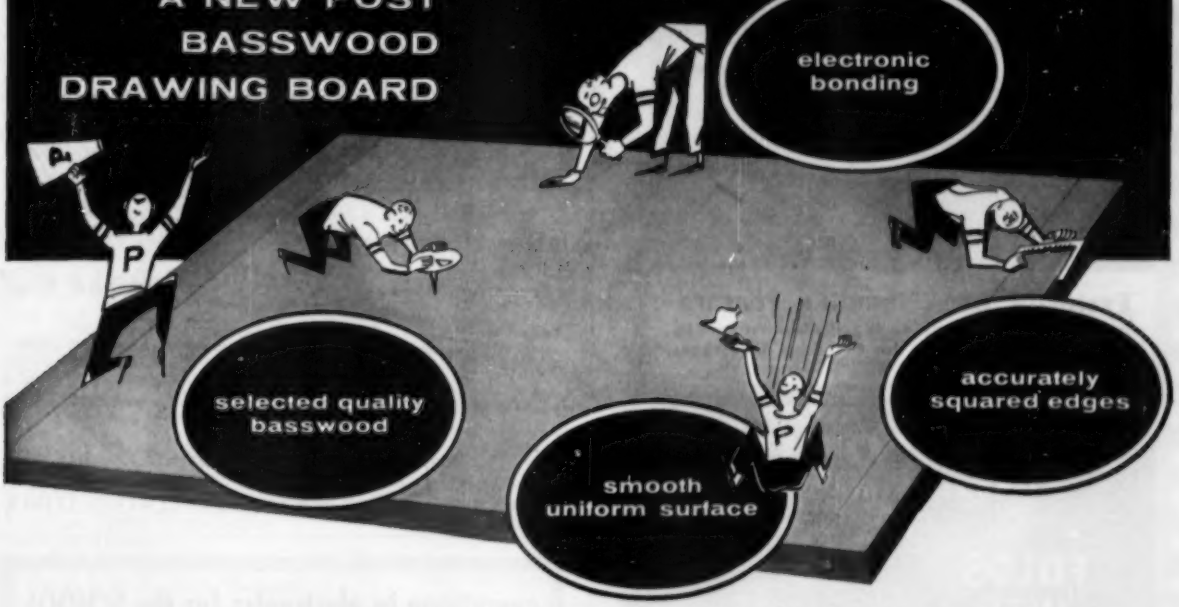
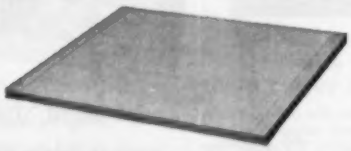
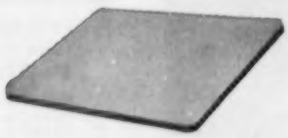


POST—maker of the world's finest drawing boards —knows how to achieve economy at no sacrifice in working quality!

Post's extensive woodworking facilities now enable you to achieve substantial savings in your basswood drawing board purchases. In "working" qualities—smooth flat surface . . . accurately squared edges . . . strong, durable, non-warping construction—Post's new #7253 board is *identical* with the finest, yet priced to meet educational budgets.



Professional grade basswood
Finest clear white basswood, carefully selected and scientifically seasoned. Skillfully manufactured with electronic bonding construction for super-strength and non-warp, accuracy. Fine, smooth-finished surfaces on both sides, free from hard spots, absolutely white surface!



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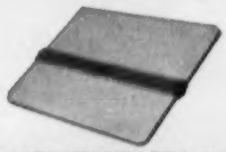

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(Continued from page 28A)

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New York 20, New York

Film Strips, Oil: From Earth to You
Petroleum in Today's Living
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American Frontier, 16mm. sound, black and white
Crossroads, U.S.A., 16mm. sound, black and white
Man on the Land, 16mm. sound, technicolor

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How Rayon Is Made, 35 mm. black and white silent filmstrip, 67 frames
Science Spins A Yarn, 16mm. technicolor sound motion picture
Your Attitude is Showing, 35mm. sound and color filmstrip
Facts About Rayon Fabrics, black and white silent filmstrip
How We Get Our Rayon, black and white silent filmstrip, approximately 40 frames

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Washington 4, D. C.

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Arabian American Oil Company
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New York 22, N. Y.

Desert Venture, 16mm. sound color

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Broad at Elm
Ridgefield, New Jersey
or
79 E. Adams Street
Chicago, Illinois
or
351 Turk Street
San Francisco, California
or
1108 Jackson Street
Dallas, Texas

The Fabulous 500, 16mm. color
Goggles and Gauntlets, 16mm. color
Liberia, Africa's Only Republic, 16mm. color
Miracle of Rubber, 16mm. color
Building of a Tire, 16mm. color
Better and Safer Highways, 16mm. black and white
Champions All, 16mm. color

Bray Studios, Inc.
729 Seventh Avenue
New York 19, New York

Refining of Petroleum, 16mm. silent black and white

Byers Company, A. M.
1502 Mellie Esperson Building
Houston 2, Texas

Eternally Yours, 16mm.
A Winter Wonder

Carrier Corporation
300 South Geddes Street
Syracuse 1, New York

Service Unseen, colored film, 16mm.

Case Company, Inc., J. I.
Racine, Wisconsin

Betty's Fruit Groves, 16mm. color
One Equals Four, 16mm. color
You Be The Judge, 16mm. color
Storage Curing of Baled Hay, 16mm. color
Harvesting Seeds of Plenty, 16mm. color
Chop The Crop, 16mm. color
Modern Farm Machines Bring Back the Range, 16mm. color
Strips and Curves, 16mm. color
Water Spreading, 16mm. color
More Food From Fewer Acres, 16mm. color
Soil and Life, 16mm. color
Win Against Water, 16mm. color
Broad Base Terracing, 16mm. color
Build Good Terraces, 16mm. color
Moldboard Plow Terraces, 16mm. color

(Continued on next page)

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☐ 10" ☐ 11" ☐ 13" Sheldon Lathes
☐ 13" ☐ 15" Sebastian Geared Head Lathes
☐ Horizontal Milling Machine ☐ 12" Shaper

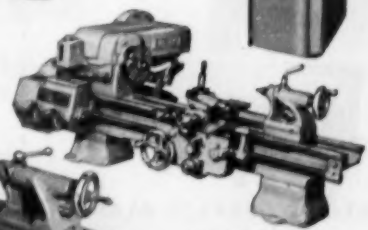
Better Machine Tools for Teaching
. . . safer to operate, easy to learn on

For every school shop, laboratory and classroom . . . (from beginning classes in industrial arts and vocational education through advanced courses in trade schools and universities) . . . Sheldon builds a lathe to fit each academic, space and budget requirement.

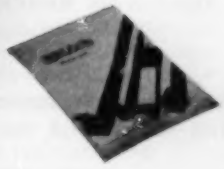
Sheldon lathes are modern in design. With their easy-to-operate controls, students can learn basic lathe operations quickly and rapidly advance to practical shop projects.

From the largest 15" swing geared head lathe to the smallest 10" swing bench lathe, every Sheldon-built lathe meets the same rigid standards . . . standards that insure long life with minimum maintenance requirements in your school shop.

UM-56 P
13" Swing
Precision Lathe


No. L-46 Sheldon
10" Precision Lathe

Sheldon-Built
Sebastian 13" and 15" Geared Head
Precision Lathes



SHELDON MACHINE CO., Inc.
Builders of Sheldon Lathes, Milling Machines, Shapers and Sebastian Lathes.
4244 North Knox Avenue • Chicago 41, Illinois

TEACHING MATERIALS

(Continued from previous page)

Level Farming, 16mm. color
Building a Pond, 16mm. color
Pageant of Progress, 16mm. color
Hydraulic Controls, 16mm. color
Advanced Farm Practices, 16mm. color
Operation Combine, 35mm. slide film
Plow Pointers, 35mm. slide film
More From Your Mower, 35mm. slide film
Field Chopping, 15 minute slide film, 35mm.
More Benefits From Manure, one-color strip film

Champion Paper and Fibre Company, The
Public Relations Department
General Office
Hamilton, Ohio

Good Business, 16mm. sound color
Paper Work, 16mm. sound color
Deep Roots, 16mm. sound color

Colburn Laboratory, George W.
Agency for International Harvester Film Library
164 North Wacker Drive
Chicago 6, Illinois

Day in Court, black and white, 16mm.
Man With A Thousand Hands, 16mm. color
Inside Harvester, 16mm. color
An African Adventure, 16mm. color
County Fair, color, 16mm.
Farmall Fair, 16mm. color
Mr. O'Flynn's Fifty Million Wheels, black and white, 16mm.
Fresh From the Garden, color, 16mm.
For Land's Sake, 16mm. color
Golden Harven, black and white, 16mm.
International Pictorial, color, 16mm.
It's More Than Hay, color, 16mm.
Jungle Yachts in the Belgian Congo, black and white, 16mm.
King of the Fibers, color, 16mm.
Romance of the Reaper, black and white, 16mm.
Soil, Water, and People, color, 16mm.
Tailor-Made for Every Job, color, 16mm.
Twine From Around the World, color, 16mm.
Under Western Skies, color, 16mm.
Permanent Agriculture, black and white, 16mm.
Streamlined Service, black and white, 16mm.
A Way of Life, 16mm. color
International Diesel Power, black and white, 16mm.
Loads of Coal, color, 16mm.
Monarchs of the Forest, color, 16mm.
The New TD-24, color, 16mm.
The "Desert Whipping Post," color, 16mm.
Power that Brings You Oil, color, 16mm.
Save Those Tools, black and white, 16mm.
There's Work Being Done, color, 16mm.
Animal All-Stars, color, 16mm.
Honeymoon for Harriet, color, 16mm.
Frozen Treasure, color, 16mm.
Helpful Henry, black and white, 16mm.

The following films have also been cleared for television:

Day in Court, County Fair, For Land's Sake, Romance of the Reaper (short version only), Tailor-Made For Every Job, Twine From Around the World, Streamlined Service, The New TD-24, There's Work Being Done, Animal All-Stars, Frozen Treasure, Helpful Henry, Honeymoon for Harriet, and Young Mr. America (inside Harvester).

Columbia Gas System, Inc.
120 East 41st Street
New York 17, New York

The Eternal Flame, 16mm. sound color

Compressed Air And Gas Institute
1410 Terminal Tower
Cleveland 13, Ohio

Compressed Air Power, 16mm. sound-color motion picture

Cooperage Industries of America, Inc.
408 Olive Street
St. Louis 2, Missouri

Helping America Deliver the Goods, 16mm. sound color
The Container on Wheels, 16mm. color sound film

Armed Forces Films
To Obtain Army Films

Requests for the loan of Army motion pictures should be addressed to the Commanding General of the appropriate Army Area, ATTN: Signal Officer. Army Area Headquarters and the states they service are listed below:

FIRST ARMY
Governors Island
New York 4, New York
ATTN: Signal Officer

Maine	Rhode Island
New Hampshire	Connecticut
Vermont	New Jersey
Massachusetts	New York

SECOND ARMY
Ft. George G. Meade, Maryland
ATTN: Signal Officer

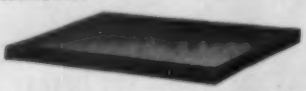
Pennsylvania	West Virginia
Maryland	Kentucky
Virginia	Delaware
Ohio	

THIRD ARMY
Ft. McPherson, Georgia
ATTN: Signal Officer

North Carolina	Alabama

(Continued on page 34A)

LAYOUT SURFACE PLATES
Special analysis semi-steel plates, precision ground or planer finished for accuracy in layouts and assemblies.



Semi-Steel BENCH PLATES
In a wide range of planer finish or precision ground surfaces of 2" and 4" thickness. Steel stand optional.

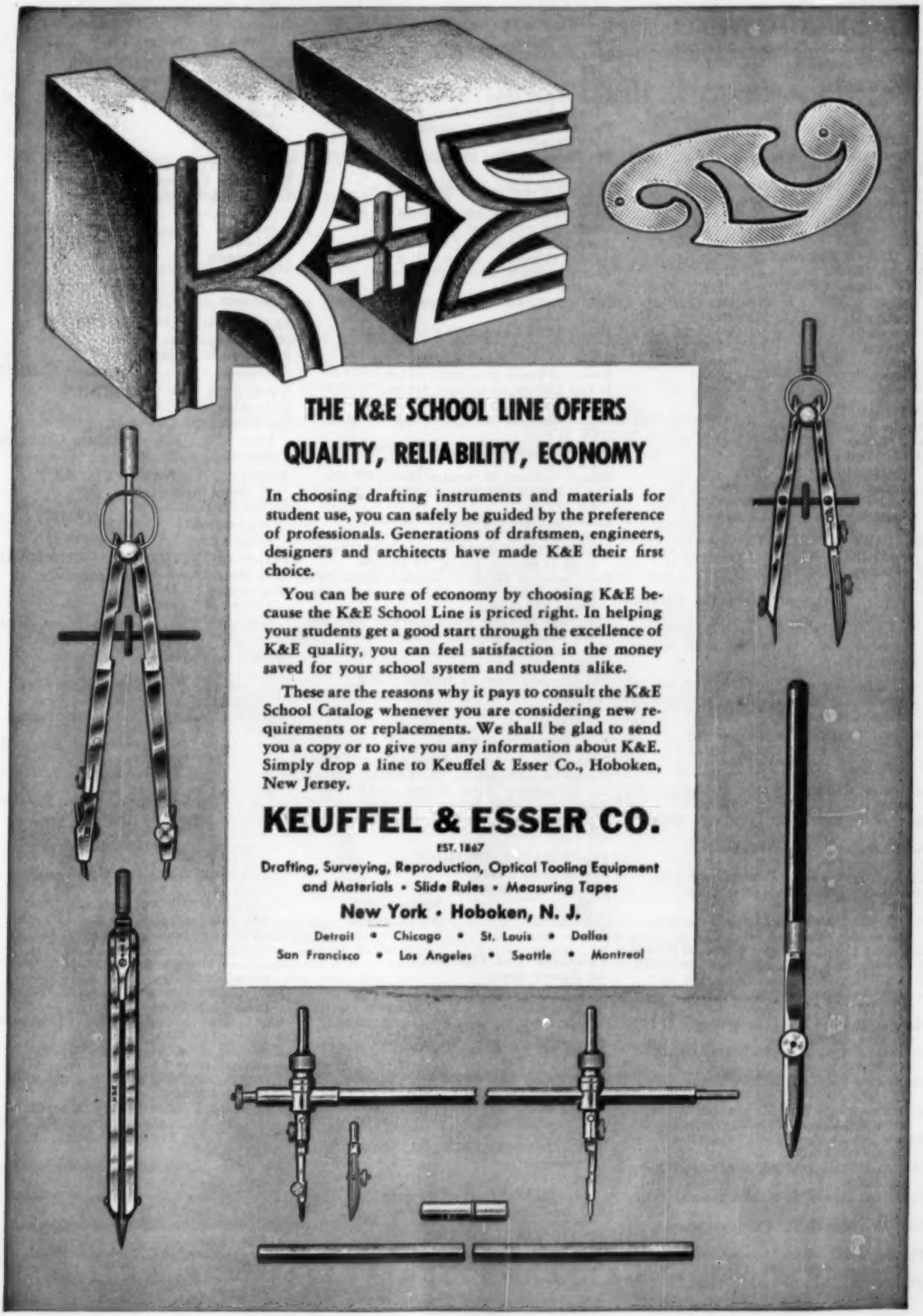
CHALLENGE WORK BENCHES
2" cast-iron top, heavy channel steel legs mean less wear; -less maintenance. Provides "natural, left-handed lighting" and "front-to-back" classroom efficiency. 16 models, with 4 or 6 legs. Shelf, drawer, wheels optional.

CHALLENGE PAPER CUTTERS
Styles for every shop. Including lever cutters in bench and floor models . . . hand-clamp power cutters . . . and full-hydraulic models. Each with features that have made Challenge first in Cutting!

792

THE CHALLENGE MACHINERY COMPANY
Office, Factories and Show Room:
GRAND HAVEN, MICHIGAN

Challenge®



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QUALITY, RELIABILITY, ECONOMY

In choosing drafting instruments and materials for student use, you can safely be guided by the preference of professionals. Generations of draftsmen, engineers, designers and architects have made K&E their first choice.

You can be sure of economy by choosing K&E because the K&E School Line is priced right. In helping your students get a good start through the excellence of K&E quality, you can feel satisfaction in the money saved for your school system and students alike.

These are the reasons why it pays to consult the K&E School Catalog whenever you are considering new requirements or replacements. We shall be glad to send you a copy or to give you any information about K&E. Simply drop a line to Keuffel & Esser Co., Hoboken, New Jersey.

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San Francisco • Los Angeles • Seattle • Montreal

TEACHING MATERIALS

(Continued from page 32A)

South Carolina — Tennessee
Georgia — Mississippi
Florida

FOURTH ARMY
Ft. Sam Houston, Texas
ATTN: Signal Officer

Arkansas — New Mexico
Texas — Louisiana
Oklahoma

FIFTH ARMY
1660 E. Hyde Park Blvd.
Chicago, Illinois
ATTN: Signal Officer

Illinois — Nebraska
Michigan — Minnesota
Wisconsin — North Dakota
Missouri — South Dakota
Kansas — Wyoming
Indiana — Colorado
Iowa

SIXTH ARMY
Presidio of San Francisco
San Francisco, California
ATTN: Signal Officer

Washington — Utah
Oregon — Nevada
Idaho — Arizona
Montana — California

MILITARY DISTRICT OF WASHINGTON
Washington 25, D. C.
ATTN: Signal Officer

District of Columbia and the Greater Washington Area. (All requests from Maryland and Virginia outside this area should be sent to Second Army as indicated above.)

All films, except those preceded by an asterisk (*), may be shown on television programs presented as a public service.

Alliance for Peace, 38 minutes, 16mm., MF 7925
A Look Ahead, 27 minutes, 16mm., MF 12-8201
Assignment Germany, 14 minutes, 16mm., MF 7591
Bands of the U. S. Army, 14 minutes, 16mm., MF 7873
Dress Rehearsal, 13 minutes, 16mm., MF 20-7924
Edition Tokyo, 9 minutes, 16mm., MF 7744
Everybody's Army, 15 minutes, 16mm., MF 7870
Field Artillery Action in Korea, 14 minutes, 16mm., MF 7900
Hail Alma Mater, 6 minutes, 16mm., MF 7805
Hell for Leather, 10 minutes, 16mm., MF 1278
Hit the Beach, 18 minutes, 16mm., MF 7727
Invisible Rampart, 16 minutes, 16mm., MF 7697
Made in Occupied Japan, 14 minutes, MF 7561, 16mm.
No Greater Heritage, 16mm., 20 minutes, MF 7858
Preamble to Peace, 10 minutes, 16mm., MF 1412
Quartermaster At Work, 19 minutes, 16mm., MF 10-7937
Science and the Signal Corp, 19 minutes, 16mm., MF 7710
Seventh Infantry Division, 22 minutes, 16mm., MF 7533
Soldiers of Leisure, 14 minutes, 16mm., MF 7936
That Men May Fight, 14 minutes, 16mm., MF 7923
The Big Wheel — 35th Infantry Division, 17 minutes, 16mm., MF 7723
The Fighting First, 15 minutes, 16mm. MF 1279
The First Forty Days, 24 minutes, 16mm., MF 7761
The Great Gun, 12 minutes, 16mm., MF 9-7940
The Long Rifle, 13 minutes, 16mm., MF 7871
The Red Bull Attacks — 34th Infantry Division, 16mm., MF 7555, 21 minutes
The Story of MDAP, 25 minutes, 16mm., MF 7844
The Sunset Division, 13 minutes, 16mm., MF 7730
This is West Point, 25 minutes, 16mm., MF 7726
Thou Shalt Have Faith, 7 minutes, 16mm., MF 7806
Troop Information and Education in The Field, 17 minutes, 16mm. MF 20-7979
Your Army in Disaster Relief, 18 minutes, 16mm. MF 7546
27th Infantry Division, 20 minutes, 16mm., MF 130-7929
36th Infantry Division, 21 minutes, 16mm., MF 130-7931
Pro Patria Vigilans, 22 minutes, 16mm., TV-163
Power for Peace, 20 minutes, 16mm., OSD-1
D-Day Convoy, 19 minutes, 16mm., HR-B-15
Citizens in Arms, 8 minutes, 16mm., OF 48
Take Time for Tomorrow, 15 minutes, 16mm., OF 55
Army Aviation, Part II, 16mm., 12 minutes, FB 261
Ranger Training, 28 minutes, 16mm., FB 283
The Military Police Story, 33 minutes, 16mm., FB 287
Industrial Plant Protection, 29 minutes, 16mm., TF 19-1847
Military Police Support in Amphibious Operations, 14 minutes, 16mm., TF 19-1806
Preparation of Foods, 17 minutes, 16mm. PT. I Basic White Sauce, Breaded and Ground Meats, TF 10-1911
*First Aid Part I — Major Wounds, Fractures and Burns, 38 minutes, 16mm. TF 8-1571
The Army Engineer, 22 minutes, 16mm., TF 5-1688
The Chaplain Story, 15 minutes, 16mm., TF 16-1943

DEPARTMENT OF THE NAVY
MOTION PICTURES
To Obtain Navy Films

Request for the loan of Navy motion pictures should be addressed to the Commandant of the appropriate Naval District: ATTN: Assistant for Public Information. Addresses of the Naval Districts and the states they service are listed below:

FIRST NAVAL DISTRICT
495 Summer Street
Boston 10, Massachusetts

Maine — Massachusetts
Vermont — Rhode Island
New Hampshire

THIRD NAVAL DISTRICT
90 Church Street
New York 7, New York

Connecticut — New Jersey (northern half)
New York

FOURTH NAVAL DISTRICT
U. S. Naval Base
Philadelphia 12, Pennsylvania

Pennsylvania — Ohio
New Jersey (southern half) — Delaware

FIFTH NAVAL DISTRICT
U. S. Naval Base
Norfolk 11, Virginia

Maryland — Virginia
West Virginia — Kentucky

SIXTH NAVAL DISTRICT
U. S. Naval Base
Charleston, South Carolina

North Carolina — Alabama
South Carolina — Tennessee
Georgia — Mississippi
Florida

EIGHTH NAVAL DISTRICT
Federal Office Building
New Orleans 12, Louisiana

Louisiana — Texas
Arkansas — New Mexico
Oklahoma

NINTH NAVAL DISTRICT
U. S. Naval Training Center
Great Lakes, Illinois

Michigan — North Dakota
Indiana — South Dakota
Illinois — Nebraska
Wisconsin — Kansas
Minnesota — Colorado
Iowa — Wyoming
Missouri

ELEVENTH NAVAL DISTRICT
Navy Headquarters Building
San Diego 30, California

Arizona — Southern California

TWELFTH NAVAL DISTRICT
Federal Office Building
San Francisco 2, California

Utah — Northern California
Nevada

THIRTEENTH NAVAL DISTRICT
U. S. Naval Station
Seattle 99, Washington

Washington — Idaho
Oregon — Montana

POTOMAC RIVER NAVAL COMMAND
U. S. Naval Gun Factory (Bldg. 200)
Washington 25, D. C.
District of Columbia

(NOTE: Films marked with an asterisk (*) are *NOT* cleared for television.)

Alliance for Peace, 38 minutes, 16mm., MA 7826
Annapolis Story, 28 minutes, 16mm., color, MN 9241
*Antarctic Expedition, 18 minutes, 16mm., MA 2431
*Army-Navy Football Game 1948, 35 minutes, 16mm., MN 6749
*Atomic Bomb Test — Bikini Island, 18 minutes, 16mm., MN 5352
Away Boarders, 19 minutes, 16mm., MN 9031
Beachhead Secured, 14 minutes, 16mm., MN 6707
*Brought to Action, 21 minutes, 16mm., MN 5297
Carrier Action Off Korea, 13½ minutes, 16mm., MN 9272
Clergymen In Uniform, 10 minutes, 16mm., MN 7329
Cold Weather Seabee, 14 minutes, 16mm., MN 9183
Command of the Seas — Arctic, 17 minutes, 16mm., MN 7459a
Command of the Seas — Pacific, 17 minutes, 16mm., MN 7459b
Command of the Seas — Atlantic, 17 minutes, 16mm., MN 7459c
Command of the Seas — United States, 17 minutes, 16mm., MN 7459d
David Taylor Model Basin, 12 minutes, 16mm., MN 8095
Dear Boss, 25 minutes, 16mm., MN 7400
Fighter Photo, 26 minutes, 16mm., MN 7893
Fighting Lady's Family, 24 minutes, 16mm., MN 6739
A Fighting Lady Speaks, 10 minutes, 16mm., MN 7283
The Fleet That Came To Stay, 38 minutes, 16mm., MN 5802
The Floating Fortress, 14 minutes, 16mm., MN 7834
*Fury in the Pacific, 20 minutes, 16mm., MN 9045

(Continued on page 36A)

NOW. . . student tables in 6 handsome finishes and more solidly built than ever!

Everything about Hamilton student tables reflects constant research into the exact demands of the schools that use them: the good selection of tables to meet varying needs . . . their stronger Northern Hard Maple construction their economy and long service to suit every school budget. And now, following the modern trend, a choice of six handsome finishes to help create an attractive, pleasant atmosphere conducive to better work by both student and instructor.

They're outstanding tables in every way – from quality to performance to price. See your Hamilton dealer for more information without obligation, or write Hamilton for his name.

DESIGNED IN SCHOOLS • BUILT BY HAMILTON •

A sampling of the Hamilton line

STUDENT DRAFTING TABLE ASSEMBLY—Basic Table V-1620 (available separately) is shown here with tool drawer unit V-1621 and board storage unit V-1623 (arrangement reversible for left or right aisle). Adjustable top securely positioned with two handwheels and adjustable rods. Stationary paper ledge. Black iron pipe footrest. Overall length, 38½"; width, 28½"; height, 40".

V-1625 is practically identical to this table but with split top.

STUDENT ART TABLE V-1704—Tilting top has automatic adjusting device; no protruding levers. Paper ledge is adjustable. Legs equipped with steel gliders. Can be ordered (as V-1704-A) with book compartment replacing drawer. Overall length, 34"; width, 20⅛"; height, 30".

V-1703 is practically identical to this table, but larger: 36" x 24⅛" x 30".

All tables made of Northern Hard Maple – in choice of Blonde (in crated stock), Driftwood, Ocean Spray, Saddle Brown, Honey Maple, or Granite Gray finishes.

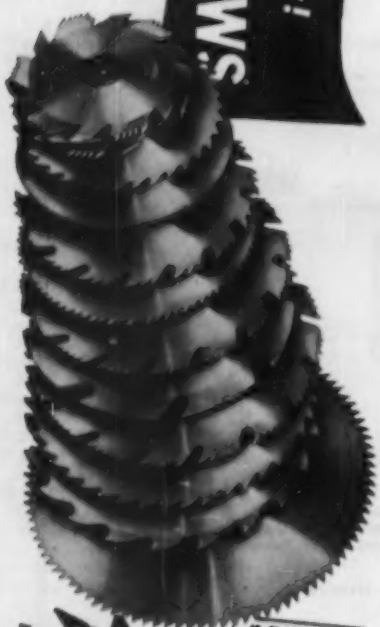
Hamilton LABORATORY EQUIPMENT

HAMILTON MANUFACTURING COMPANY . Two Rivers, Wisconsin

Lowest Prices for Top Quality!
SIMONDS SI-CLONE SAWS

You get Simonds Guaranteed Quality, the buy-word in saws for more than 100 years, at no more than you would pay for regular saws . . . see price list. And Simonds Si-Clone line includes 13 types up to 12" diameter. So get the Si-Clones you need *today* at your local hardware or woodworking machinery dealer.

GUARANTEE: Made of SIMONDS STEEL fully guaranteed against any defect in material or workmanship.



RETAIL SELLING PRICES

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASS.
Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon.

TEACHING MATERIALS

(Continued from page 34A)

The Navy Nurse, 23 minutes, 16mm., MN 7339
*History of Lighter Than Air Rigid Airships, 40 minutes, 16mm., MN 2722d
History of the United States Navy — War of Independence, 20 minutes, 16mm., FN 6943a
History of the United States Navy — The Naval Wars With France and Tripoli, 26 minutes, color, 16mm., FN 6943b
Hospital Afloat, 9 minutes, 16mm., MN 7371
Ice Breaker, 14 minutes, 16mm., MN 7336
Memorial Day, 21 minutes, 16mm., MN 7372
Navy Chapels in the Pacific, 12 minutes, 16mm., MN 9153
Navy Photography in Intelligence, 17 minutes, 16mm., MN 5348d
Naval Photography in Science, 28 minutes, 16mm., MN 5348c
Navy and Science, 12 minutes, 16mm., MN 6658
*One Man Task Force, 27 minutes, 16mm., MN 5355
Power for Peace, 20 minutes, 16mm., MN 6846
*Prelude to Victory, 40 minutes, 16mm., MN 9119b
Ready for Sea, 14 minutes, 16mm., MN 7445
Report of the Navy, 20 minutes, color, 16mm., MN 7866
Resuscitation — Back Pressure Armlift Method, 15 minutes, 16mm., MN 7484
Seabee Can Do Plus, 15 minutes, 16mm., MN 6841
Seapower For Freedom, 28 minutes, 16mm., MN 7838
Seapower in the Pacific, 30 minutes, 16mm., MN 6124
Sea Power For Peace, 9 minutes, 16mm., MN 6704
*Silent Service, 38 minutes, kodachrome, 16mm., MN 9141
Story of Naval Aviation, 28 minutes, 16mm., MN 7969
Take 'Er Down, 13½ minutes, 16mm., MN 9294
Take Time For Tomorrow, 12 minutes, 16mm., MN 6649
Teamed For Defense, 14 minutes, 16mm., Released 1953
The Real Miss America, 10 minutes, 16mm., MC 7847
The Chaplain Comes Aboard, 13 minutes, color 16mm., MN 9243
*They Came to an Island, 35 minutes, 16mm., MN 5834
The Sixth Fleet, 28 minutes, 16mm., MN 7857
This is Your Navy, 12 minutes, 16mm., MN 6775a
Underwater Demolition Team, 6 minutes, 16mm., MA 6884
*The Zipper Fleet, 10 minutes, 16mm., MN 6647
For Which We Stand, The Golden Moment, 20 minutes, 16mm., MN 5321G

Department of the Air Force Motion Pictures To Obtain Air Force Films

Requests for loan of Air Force motion pictures should be addressed to the Public Information Officer of the appropriate Film Exchange Headquarters; ATTN: Control Film Library. Addresses of these Headquarters and the states they service follow:

EASTERN FILM EXCHANGE HQ
1612 South Cameron Street
Harrisburg, Pennsylvania

Connecticut	New Hampshire
Delaware	New Jersey
District of Columbia	New York
Illinois	Ohio
Indiana	Pennsylvania
Kentucky	Rhode Island

in the metal shop or woodworking . . .

WILTON VISES
have
LONGER LIFE, GREATER VALUE!

WILTON MACHINISTS'

Vises are made of stronger **malleable iron**, yet weigh more than ordinary grey iron vises! Body is fully enclosed, contains permanent lubrication.

WILTON WOODWORKERS'

Vises now available in 16 models — many with the new patented Rapid Titan nut which **eliminates nut wear** common to other rapid action vises. Unconditional 3 year guarantee!

WILTON
TOOL MFG. CO., INC.

Mail the coupon now for free catalog showing complete Wilton line!

WILTON TOOL MFG. CO., INC.
Schiller Park, Illinois
Gentlemen: Please send me your free catalog.

Name.....
School.....
Address.....
City.....Zone.....State.....

Maine	Vermont
Maryland	Virginia
Massachusetts	West Virginia
Michigan	Wisconsin

MIDWESTERN FILM EXCHANGE HQ
Kelly Air Force Base
San Antonio, Texas

Arkansas	Nebraska
Colorado	New Mexico
Iowa	North Dakota
Kansas	Oklahoma
Louisiana	South Dakota
Minnesota	Texas
Missouri	

SOUTHERN FILM EXCHANGE HQ
Orlando Air Force Base
Orlando, Florida

Alabama	North Carolina
Florida	South Carolina
Georgia	Tennessee
Mississippi	

WESTERN FILM EXCHANGE HQ
McClellan Air Force Base
McClellan, California

Arizona	Oregon
California	Utah
Idaho	Washington
Montana	Wyoming
Nevada	

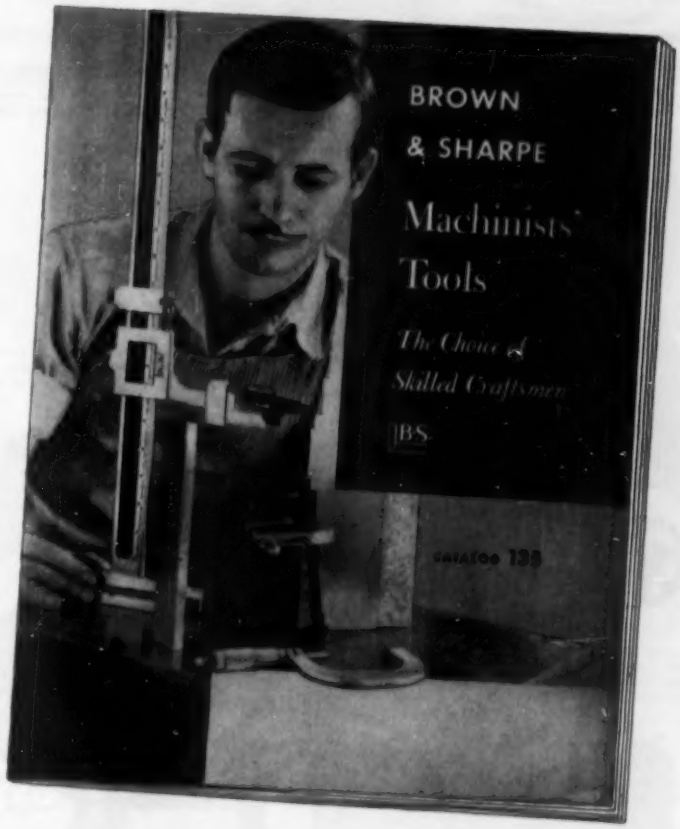
(NOTE: Films marked with an asterisk (*) are *NOT* cleared for television.)

Air Force Digest, 14 minutes, 16mm., AFD 1-1
Air Force Digest, AFD, 14 minutes, 16mm.
Air Force Digest, 14 minutes, 16mm., AFD 1-3
Air Force Digest, 14 minutes, 16mm., AFD 1-4
Air Force Digest, 14 minutes, 16mm., AFD 1-5
Air Force Digest, 14 minutes, 16mm., AFD 1-6
Air Force Digest, 14 minutes, 16mm., AFD 1-7
Air Force Digest, 14 minutes, 16mm., AFD 1-8
Air Force Digest, 14 minutes, 16mm., AFD 1-9
Air Force Digest, 15 minutes, 16mm., AFD 1-10
Air Force Digest, 14 minutes, 16mm., AFD 1-11
Air Force Digest, 14 minutes, 16mm., AFD 1-12
Air Chaplain, 15 minutes, 16mm., SFP 234
Air Defense, 26½ minutes, 16mm., SFP 271
Animals in Rocket Flight, 14 minutes, 16mm., SFP 316
Air Force Special Services, 14 minutes, 16mm., SFP 267
Air Science in Action, 14½ minutes, 16mm., SFP 279
Air Power, 18 minutes, 16mm., SFP 228
Air Power American, 14 minutes, 16mm., SFP 274
*Air Pattern Pacific, 42 minutes, 16mm., SFP 121
Air Progress: SFP 246, 12 minutes, 16mm.
*Air Siege, 20 minutes, 16mm., SFP 175
Alliance for Peace, 38 minutes, 16mm., SFP 305
Because she is There, 14 minutes, 16mm., SFP 280
Cargo Critical, 14 minutes, 16mm., SFP 255
*China Crisis, 45 minutes, 16mm., SFP 174
Civil Air Patrol, 20 minutes, SFP 251, 16mm.
Dividends for the Future, 18 minutes, 16mm., SFP 231
*Fight for the Sky, 20 minutes, SFP 157a, 16mm.
Front Line Air Force Chaplains, 14 minutes, 16mm., SFP 261
Gateway, 18 minutes, 16mm., SFP 245
Jet Test, 14 minutes, 16mm., SFP 266
Know Your Air Force Better, 15 minutes, 16mm., SFP 242
Look to the Skies, 18 minutes, 16mm., SFP 252
New Wings for Peace, 10 minutes, 16mm., SFP 233
Operation Vittles, 15 minutes, 16mm., SFP 240
Plans for the Future, 27 minutes, 16mm., SFP 254
Peace Through Strength, 14½ minutes, 16mm., SFP 276

(Continued on next page)

New!

Student-Aid Catalog Shows Precision Tools "In Action"!



Here's a catalog that will help students to handle precision tools more efficiently! Besides illustrating the *complete* line of Brown & Sharpe Machinists' Tools, its 48 pages contain basic information and instructive photos showing tools in use.

Profusely illustrated sections on micrometers, rules, combination squares, gages, and other precision tools, clearly show how advanced design features insure high, positive precision . . . how correct use "transfers" this precision into fine workmanship.

Make sure each of *your* students has a copy. Mail coupon.

Brown & Sharpe BS

BROWN & SHARPE MFG. CO., Providence 1, R. I., U.S.A.

Please send me (.....) copies of Catalog 135.

NAME ..... TITLE .....

SCHOOL .....

ADDRESS ..... CITY .....

TEACHING MATERIALS

(Continued from previous page)

Power For Peace, 20 minutes, 16mm., OSD-1
Ready for Flight, 14 minutes, 16mm., SFP 247
Road Show, 11 minutes, 16mm., SFP 244
Salute to the Ladies, 18 minutes, 16mm., SFP 227
Small Business and The Air Force, 20 minutes, 16mm., SFP 306
Strategic Air Power, 25 minutes, 16mm., SFP 260
Sustained Operations, 10 minutes, 16mm., SFP 249
*Target for Today, 93 minutes, 16mm., SFP 189 and/or TF 1-3384
*Target Invisible, 8 minutes, 16mm., SFP 199
*Target Nevada, 13½ minutes, color, 16mm., SFP 281
*Target Tokyo, 20 minutes, 16mm., SFP 153
That Men May Fly, 28 minutes, 16mm., SFP 236
The Lord's Prayer, 3 minutes, 16mm., SFP 259
The Mt. Clemens Story, 14½ minutes, 16mm., SFP 272
The Third Pillar, 18 minutes, 16mm., SFP 229
Thunder From the Sky, 14 minutes, 16mm., SFP 264
The Real Miss America, 10 minutes, 16mm., SFP 282
Watchdog of the Air Force Dollar, 12 minutes, 16mm., SFP 286
Weekend Paratrooper, 11 minutes, 16mm., SFP 262
Wings for Roger Windsock, 14 minutes, 16mm., SFP 270
Women in the Air Force, 14 minutes, 16mm., SFP 258
Your Air Force in Action, 14 minutes, 16mm., SFP 256
*Army Air Force Pacific, 15 minutes, 16mm., CFR 504
Highways in the Sky, 29 minutes, color, 16mm., TF 1-4803
*One Plane, One Bomb, 14 minutes, 16mm., unnumbered
That Others May Live, 45 minutes, 16mm., TF 1-4619
The Strategic Attack, 50 minutes, color, 16mm., TF 1-4613

United States Marine Corps Motion Pictures

To Obtain Marine Corps Film

Request for the loan of Marine Corps motion pictures should be addressed to the Director of the appropriate Marine Corps Reserve and Recruitment District. Addresses of these Districts and the states they service are listed below:

1ST MARINE CORPS RESERVE AND RECRUITMENT DISTRICT
495 Summer Street
Boston, Massachusetts

Maine	Rhode Island
Vermont	New York
New Hampshire	New Jersey (northern half)
Massachusetts	
Connecticut	

4TH MARINE CORPS RESERVE AND RECRUITMENT DISTRICT
10th Floor, Rittenhouse Square Bldg.
19th & Walnut Streets
Philadelphia 3, Pennsylvania

New Jersey (southern half)	Ohio
Pennsylvania	Delaware (northern half)

5TH MARINE CORPS RESERVE AND RECRUITMENT DISTRICT
Henderson Hall
Building No. 4

Delaware (southern half)	Kentucky
Maryland	North Carolina (northeast)
West Virginia	District of Columbia
Virginia	

6TH MARINE CORPS RESERVE AND RECRUITMENT DISTRICT
Room 541 Peachtree, Seventh Building
50 — 7th Street, N.E.
Atlanta, Georgia

North Carolina (except northeast)	Georgia
Tennessee	Alabama
South Carolina	Mississippi
	Florida

8TH MARINE CORPS RESERVE AND RECRUITMENT DISTRICT
6th Floor, Lowich Bldg.
2026 St. Charles Avenue
New Orleans 12, Louisiana

Arkansas	Texas
Louisiana	New Mexico
Oklahoma	

9TH MARINE CORPS RESERVE AND RECRUITMENT DISTRICT
Room 703, U. S. Court House
225 S. Clark Street
Chicago 4, Illinois

Michigan	North Dakota
Indiana	South Dakota
Illinois	Nebraska
Wisconsin	Kansas
Minnesota	Colorado
Iowa	Wyoming
Missouri	

12TH MARINE CORPS RESERVE AND RECRUITMENT DISTRICT
Bldg. 3, Room 504

(Continued on page 40A)

THE *Nichols* TOOL ROOM MILLER

"the miller that uses its head!"

A valuable accessory is the Nichols Heavy-Duty Vertical Milling Attachment. Takes full 1½ H. P. up to 2000 R. P. M. (So precise, some shops use it for jig boring!)

The unusual versatility and extra capacity of this model make it extremely useful for the tool room. Because it is equipped with the "rise-and-fall" spindle, it can perform not only conventional precision milling, but also facing boring, key seating, contour milling and other operations. Both longitudinal and transverse feed screws are fitted with hand wheels and extra-large adjustable micrometer dials with easy-to-read graduations. This model is especially useful because of its compactness, generous capacity and ability to handle a wide variety of work to close tolerances —to "tenths" when desired!

CONDENSED SPECIFICATIONS

Table Working Surface	8½" x 30"
Longitudinal Travel	19"
Transverse Travel	7"
Vertical Travel—Knee	13½"
Rise and Fall of Spindle	4½"
Selective Speed Ranges up to 2000 R. P. M.	
Weight	1250 lbs.

Write today for Nichols general catalog which describes the six models of Nichols Millers. A sound, color movie, "the Miller that Uses Its Head" is available for free showing. May we reserve it for you?

MANUFACTURED BY W. H. NICHOLS COMPANY • WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS NICHOLS-MORRIS CORPORATION 76-S Mamaroneck Ave., White Plains, New York

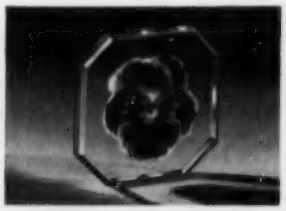
Paper Honeycomb Sandwiches for Furniture. Here is the latest high strength, light weight structural material that is rapidly gaining in industrial importance. The honeycomb provides thickness and rigidity as it is sandwiched between two layers of fiberglass reinforced Castoglas resin. "Honeycomb Projects" is yours for 10¢.

Preserve It Permanently in Glass-Like Castolite. The embedding of industrial, botanical, biological and decorative specimens in Castolite is only one example illustrating the scope and possibilities of this versatile resin. Specific projects and basic principles are explained in "How to Cast Castolite Liquid Plastic." It's 25¢ a copy.

Decorative Table Tops of Fiberglass laminates and colorful textile fabrics are combined with wood and metal legs. Rectangular table is wood-bamboo mat-fiberglass combination.

Colorful Candy and Fruit Dishes are beginners projects described in the new school folder. Designs were silk-screened between layers of fiberglass fabric.

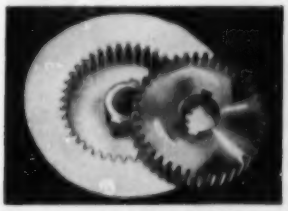
Key Tags Containing Embodments of four leaf clover, fish fly and gold initials. Easily made and inexpensive, they are excellent take-home projects.



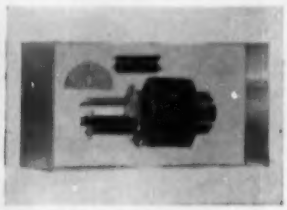
A Real Pansy Flower, its beauty permanently preserved in Castolite. Castings like this make distinctive coasters, paper weights and bookends for your own use or for gifts.

A Modern Fiberglass Chair. Complete illustrated instructions for laminating a fiberglass chair over a plaster mold are published in the March 1955 CASTOLITER. 10¢ per copy.

This 12-foot All-Fiberglass Boat Weighs Only 115 Lbs. Our manual, "How to Build Fiberglass Boats" gives step-by-step photographic directions. Manual is 25¢ a copy.



Gear Reproduction in Clear Castolite was cast in Castomold flexible mold compound, another product of The Castolite Co. The process is described in the school folder featured below.



Visual Education Par Excellence. Exploded view of radio tube embedded in Castolite. This and other projects were made by boys in Junior High.

MAKE IT WITH Castolite LIQUID PLASTICS

WHAT MAKES LIQUID PLASTICS SO VALUABLE FOR THE SCHOOL SHOP? There are several major reasons, foremost of which are these:

1. **EASE OF HANDLING** — the method of forming a candy bowl is merely one of spreading liquid resin over a surface of fiberglass. Making a 21-foot cruiser is much the same. Both are made by a hand lay-up method.

2. **THEY ARE "NATURALS" WITH WOOD AND METAL PROJECTS** — combination projects are the trend today. Wood and metal are combined with Castolite resins becoming either part of the project or being used in the process of fabricating.

3. **NO HEAT OR PRESSURE REQUIRED** — parts as small as one inch or a one-piece structure as large as a 55-foot boat hull can be made without heat or pressure . . . by hand.

4. **READILY AVAILABLE IN ANY QUANTITY** — The Castolite Company is a compounder of special liquid resin formulas. It also supplies color pigments and dyes, various hardeners, fillers, mold release agents and treated fabrics. These are available in quantities from one ounce to 500 lb. drums.

5. **ILLUSTRATED INSTRUCTIONS SHOW YOU HOW** — Directions based on practical experiments in our laboratory and field-tested in many schools and industrial plants have eliminated the technical experimental phases for you and opened the way for creative opportunities never before possible without expensive equipment.

6. **USED BY INDUSTRY AND SCHOOLS** — Castolite liquid plastics are used by nearly all major industries and educational institutions for hundreds of important industrial and scientific applications.

"FIBERGLASS AND LIQUID PLASTIC IN THE SCHOOL SHOP" contains a number of beginning lessons which were written by teachers for teachers.

FREE copy will be mailed to all teachers upon request.
Write to: School Dept. L-50.

THE CASTOLITE CO.
Woodstock, Illinois

● Producers and Distributors of Liquid Plastic and Fiberglass for Laminating, Casting, Molding and Coating.

Serving Industry, Science, the Arts and Crafts

TEACHING MATERIALS

(Continued from page 38A)

100 Harrison Street
San Francisco 6, California

Montana	Nevada
Idaho	Washington
Utah	Oregon
Arizona	California

(NOTE: All films are cleared for television.)

The Amphibious Marines, 20 minutes, 16mm., MH 6778
The Beginning, 21 minutes, 16mm., MH 6780
Centerville, USA, 17 minutes, 16mm., MH 6609
Pride of Main Street, 17 minutes, 16mm., MH 6759
Marine Air Reserve Technical Indoctrination, 13½ minutes, 16mm., MH 7914
The Marine Corps and Close Air Support, 13½ minutes, 16mm., MH 7906
Marine Corps Reserve Summer Training, 20 minutes, 16mm., MH 7493
The Marine Corps and The Helicopter, 13½ minutes, 16mm., MH 7911
Teamwork, 26 minutes, 16mm., MH 6760
Uncommon Valor, 11 minutes, 16mm., MH 7331
With The Marines — Chosin to Hungnam, 24 minutes, 16mm, MN 7314
Women Marines, 14 minutes, 16mm., MH 6975
Your Marine Band From Then Till Now, 27½ minutes, 16mm., MH 8058

Armed Forces Information & Education Motion Pictures

The following films may be borrowed from U. S. Army Film Libraries or U. S. Air Force Film Exchanges.

About Rumors, 14 minutes, 16mm., color, AFIF 41
Armed Forces Forum — George F. Kennan discusses Communism, 43 minutes, 16mm., AFIF 50
Austria, 17 minutes, 16mm., AFIF 53
Canada, 18 minutes, 16mm., AFIF 43
Dangerous War Trophies, 11 minutes, 16mm., AFIF 23
Decision at Williamsburg, 20 minutes, 16mm., AFIF 54
How to Get Along in A Foreign Country, 16 minutes, AFIF 44
How to Get Along in France, 27 minutes, 16mm., AFIF 40
1952 Olympic Games, 29 minutes, 16mm., AFIF 36
Teamwork and You, 10 minutes, 16mm., AFIF 6
The Crime of Korea, 13 minutes, 16mm., AFSR 125
Military Use of the Helicopter, 14 minutes, 16mm., AFSR 139
Our Stand in Korea, 20 minutes, 16mm., AFSR 121
Research and Development, 22 minutes, 16mm., AFSR 114
Self Preservation in an Atomic Attack, 18 minutes, 16mm., AFSR 128
The Soviet Union and Its People, 19 minutes, 16 mm., AFSR 131
Arctic Rampart, 15 minutes, 16mm., RTAF 148
Atom Atoll, 18 minutes, 16mm., RTAF 147
Follow Me, 20 minutes, 16mm., RTAF 150
Japan Logistical Command, 20 minutes, RTAF 142, 16mm.
Pilots for NATO, 20 minutes, 16mm., RTAF 146
Role of the Combat Cameraman, 14 minutes, 16mm., RTAF 141
Strategic Air Command, 20 minutes, 16mm., RTAF 145
This is Lakehurst, 17 minutes, 16mm., RTAF 144
Wright Patterson Air Force Base, 19 minutes, 16mm., RTAF 149
Battle for Time, 20 minutes, 16mm., CB 101
Chinese Reds Enter War, 21 minutes, 16mm., CB 104
*Korean Cease Fire Talks, 18 minutes, 16mm., CB 112
Reds Launch Spring Offensive, 15 minutes, 16mm., CB 110
*Stalemates in Korea, 19 minutes, 16mm., CB 113
Turning the Tide, 22 minutes, 16mm., CB 102
*U. N. Counter Attack, 17 minutes, 16mm., CB 111
U. N. Forces Consolidate Below 38th. Parallel, 20 minutes, 16mm., CB 106
U. N. Forces Cross the 38th. Parallel, 19 minutes, 16mm., CB 109
U. N. Forces Escape Trap, 16 minutes, 16mm., CB 105
U. N. Forces Move North, 17 minutes, 16mm., CB 107
U. N. Offensive, 21 minutes, 16mm., CB 103
U. N. Offensive Continues, 18 minutes, 16mm., CB 108

Douglas Fir Plywood
301 Tacoma Building
Tacoma 2, Washington

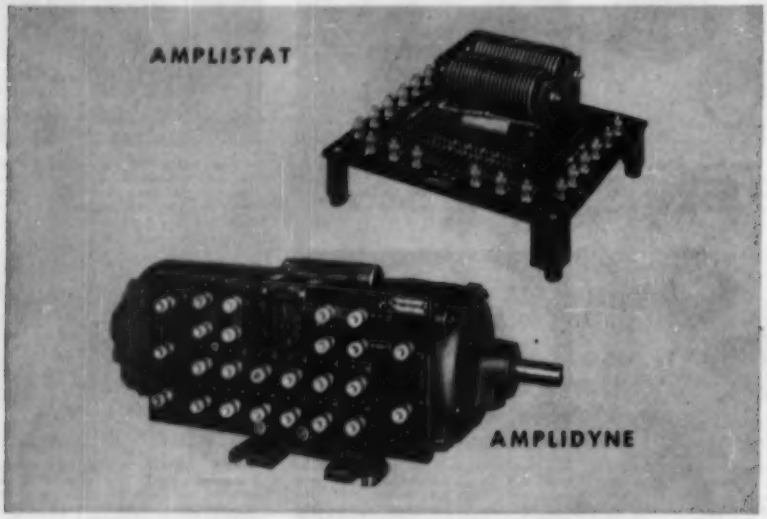
1232 Shoreham Building
Washington 5, D. C.

848 Daily News Building
Chicago 6, Illinois

500 Fifth Avenue Building
New York 18, New York

Farm-in-a-Day, 16mm., color and sound
Building a Farm Freezer, 16mm., color silent

(Continued on page 42A)



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- Load-voltage characteristic studies
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The educational amplistat demonstrates the principles of the self-saturating, polarity-conscious magnetic amplifier. You can readily set up the unit with other standard laboratory equipment to perform many basic experiments:

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- Operation of positioning systems
- Demonstration of principles of d-c current transformers and saturable reactors

For further information, contact your nearest G-E Apparatus Sales Office or write for bulletin GEC-1349, Amplistat, or GEC-590C, Amplidyne. General Electric Co., Schenectady 5, N. Y. 668-11

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General Shop

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PUBLICATION DATE January 3, 1955

By Fryklund and LaBorge

#1 You'll want this completely new text for beginning students above seventh grade.

- Covers fundamentals of hand woodworking
- Provides instruction on basic handtool operations
- 387 "show-how" drawings and pictures illustrate information topics, give details of techniques
- Plenty of new projects
- Valuable technical and related information.
- All about tools and how to use them, types of occupations, sources of wood, processing

NOW! FOR FIRST TIME — AVAILABLE IN BOTH BINDINGS
CLOTH BOUND, $3.00 PAPER BOUND, $1.25

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By O. A. Ludwig

PUBLICATION DATE August 25, 1955

#31 Don't fail to order this entirely new revision of the most complete general metalwork textbook ever published. Text describes tools, materials, and operations common to many metalworking occupations. Huge index with over 4,000 entries, completely cross-referenced. Hundreds of illustrations make it useful and interesting for high school and junior high use. 400 pages. Cloth bound. $4.40

FORGING AND WELDING

PUBLICATION DATE August 25, 1955

By Robert E. Smith

#37 Completely revised edition includes commonly used methods of welding and complete'y describes techniques used. Analysis of steps, safety precautions and details of techniques are unusually well-done. Many illustrations make text completely clear. 144 pages. $1.25

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#13 A text to meet the needs of young people for a practical working knowledge of common everyday electricity. Simple and direct in presentation and well-illustrated with drawings and photographs. Several shop projects of practical nature. 120 pages. $1.25

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By Mattingly and Scrogin

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By G. Harold Silvius and Estell H. Curry

#55 A comprehensive analysis of methods of successful shop teachers. Discussions and suggestions regarding class organization, planning work, methods and techniques, safety, selection and use of teaching materials, student evaluation and community relations. 340 pages. $4.50

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#7 By *Cleeton & Pitkin*. Standard beginner's text contains 10 new units. Numerous photographs. $3.00

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#30 By *Dragoo & Reed*. Basic beginner's text covers bench, sheet and art metal, ornamental metalwork. $1.25

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#8 By *Dragoo & Porter* (Recently revised). Beginner's text includes 26 projects. Many illustrations. $1.25

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#15 By *Fryklund & Kepler*. Beginner's text presents fundamentals of drafting in easy-to-understand language. Numerous problems. 430 illustrations. $1.25

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#60 NEW — 1954. By *J. Edgar Ray*. 194 full-page sketches and views. 256 pages. $4.80

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#2 By *Robert E. Smith*. Covers operation of lathe, circular saw, band saw, jig saw, jointer, etc. 152 pages. $3.00

GAS AND AC ARC WELDING AND CUTTING

#36 By *R. E. Jennings*. General text for beginners. Stresses common practices, safety measures. $1.25

MACHINING OF METAL

#33 By *Robert E. Smith*. Instruction on operation and care of machines. Cloth cover. $1.50

ADDITIONAL SHOP BOOKS

- #32 **MACHINE SHOP PROJECTS** By *Roy E. Knight*. 25 usable projects. $1.20
- #9 **PRINCIPLES OF ELECTRICITY** By *Wendell H. Cornetet*. 342 pages. $4.00
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- #81 **GENERAL BOOKBINDING** By *Chris Grouneau*. 64 pages. $1.20

THESE ARE ONLY SOME OF McKNIGHT'S PRACTICAL SHOP BOOKS

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Send me 1 2 7 8 9 13 14 15 17 18 22 27 28 30 31 32 33 36 37 43 50 55 60 61 67 81 (circle ones desired) for FREE 30 DAY TRIAL. I will either return books in 30 days and owe nothing or send you $..... in full payment.

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School.....

Address.....

City.....Zone....State.....

TEACHING MATERIALS

(Continued from page 40A)

DuPont de Nemours & Company, E. I.
Motion Picture Distribution
Wilmington 98, Delaware

This is Nylon, 16mm. color
Close-up of Nylon, 16mm. color
Facts about Fabrics, black and white, 16mm.
Fashion's Favorite, black and white, 16mm.
Harnessing the Rainbow, color, 16mm.
The DuPont Story, in technicolor, 16mm.
A Story of Research, in color, 16mm.
Lost Harvest, in color, 16mm.
Neoprene, the Versatile Chemical Rubber, in color, 16mm.

What Makes A Gasoline Good, 16mm. sound full color

Edited Pictures System
165 West 46th. Street
New York 36, New York

Petroleum and Its Products, 16mm. sound black and white

Esso Standard Oil Company
15 West 51st. Street
New York 20, New York

Oil of Peru, 16mm. color and sound

Ethyl Corporation
100 Park Avenue
New York 17, New York

The Long Road, 16mm. sound black and white

Gasoline for Everybody, 16mm., sound black and white

Employers Mutual Fire Insurance Company
Home Office
Wausau, Wisconsin

A Safe Day, sound, 16mm.
Are You Safe at Home?, sound 16mm.
Bicycling Safely Today, sound 16mm.
Bicycling with Complete Safety, sound, 16mm.
Four Point Safety Home, sound 16mm.
Home Safe Home, sound 16mm.
Miracle of Paradise Valley, sound, 16mm.
On Two Wheels, sound, 16mm.
Preventing Fires Through Electrical Safety, silent, 16mm.
Safety Patrol, sound, 16mm.
Sentinels of Safety, sound, 16mm.
The Case of Tommy Tucker, sound, 16mm.
The Safest Way, sound, 16mm.
You and Your Bicycle, 16mm. sound

Encyclopaedia Britannica Films
1150 Wilmette Avenue
Wilmette, Illinois

Competition and Big Business, 16mm. sound color
Petroleum, 16mm. sound black and white
Productivity: Key to Plenty, 16mm. sound black and white
Gas for Home and Industry, 16mm. sound black and white
Refining Crude Oil, 16mm. silent black and white
Fuels and Heat, 16mm. sound black and white

Federal Security Agency
Public Health Service
Washington 25, D. C.

USPHS Motion pictures, a selected list

Franks Manufacturing Corporation
P. O. Drawer 3218, Whittier, Station
Tulsa, Oklahoma

The Cruiser Story, 16mm. sound
The Rocket Story, 16mm. sound color

General Motors Corporation

Request from the western states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming should be addressed to:

General Motors Corp.
508 San Francisco Bank Building
405 Montgomery Street
San Francisco 4, California

Exhibitors in Greater New York and on Long Island should write to:

General Motors Corp.
Department of Public Relations Film Section
1775 Broadway
New York 19, New York

All other states, including that part of New York State not mentioned above, are served by:

General Motors Corp.
Department of Public Relations Film Section
General Motors Building
Detroit 2, Michigan

The Turning Point, sound motion picture in color, 16mm.
An American Miracle, sound motion picture, 16mm.
American Harvest, sound motion picture in color, 16mm.
Precisely So, sound motion picture, 16mm.
This Is Progress, sound motion picture, 16mm.
Our American Crossroads, sound motion picture, 16mm., color
Frozen Freshness, sound motion picture in color, 16mm.

(Continued on page 45A)

C & P NEW SERIES PRESSES These presses in sizes of 8x12, 10x15, 12x18 and 14½x22, provide the student with equipment that furnishes all practical requirements of hand fed press operation. May be equipped with flywheel, belt and platen guards. Also furnished for treadle operation instead of motor drive.

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PRESSES and PAPER CUTTERS

C & P BENCH CUTTER An efficient, small size cutter that handles sheets up to 19" x 24". Equipped with two-handed safety control.

The Standard for Printing Education

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In addition, special safety features are incorporated, when desired, in C & P presses and paper cutters so that all safety requirements are fully satisfied.

For practical instruction—for safety in use—the foresighted administrator recommends . . . Chandler & Price.

"HANDBOOK OF PLATEN PRESSWORK" is one of the outstanding aids to printing furnished without charge to printing instructors. If you do not have a copy, just request one.

C & P PILOT PRESS A thoroughly efficient little press, chase 6½x10, that teaches basic principles of press operation with exceptionally fine printing results.

THE CHANDLER & PRICE COMPANY
6000 CARNEGIE AVENUE • CLEVELAND 3, OHIO

quick to stick and permanent!

Use HIGGINS VEGETABLE GLUE

when you want things to stick *FOR KEEPS!*

Here's the perfect, extra-strong adhesive for sticking paper or cloth to paper, wood, leather, glass or metal. Fine for binding books and portfolios, making lampshades, scale models of sets, stretching drawing paper, etc.

Ideal for Studio, School, Home Use

Higgins Vegetable Glue is clean, smooth, sweet-smelling . . . extremely easy to use. Artists and craftsmen are constantly finding new uses for this stronger adhesive that stick things together "for keeps"!

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HIGGINS VEGETABLE GLUE

By the makers of the famous Higgins American Drawing Inks

EASY FAST

TEACH HEAT TREATING
The Modern way with
Quick Acting JOHNSON Furnaces

No. 101 Bench Furnace

Delivers up to 1800° F. without a blower. Powerful, efficient and economical. For heating soldering coppers up to 12 lbs. per pair. Ideal for heat treating, case hardening, and annealing carbon steels. Two burners. Firebox 3¾x4½x5½. Complete with baffle plate.

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Use this furnace for heat treating carbon steels and for melting soft metals such as lead, tin, zinc, babbitt, etc. Lid on hood may be removed and 22 lb. melting pot inserted. Firebox 6¼x5x6½. Complete with pot as illustrated.

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RENEW THE EFFICIENCY OF YOUR PRESENT JOHNSON FURNACES. WRITE FOR COMPLETE DETAILS ON FACTORY RECONDITIONING.

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JOHNSON GAS APPLIANCE CO.
583 E AVENUE N.W. CEDAR RAPIDS, IOWA

SCHWEIZER ANNOUNCES
AN INDUSTRIAL DESIGN CONTEST

PRIZES

1st	$50
2nd	$25
3rd	$15
4th	$10
5th	$5
6th to 10th	$4

In addition, teachers of prize winning students will receive a choice of any one of the Schweizer Aluminum Construction Kits. The Special Instructors Manual "Aluminum Construction Techniques" is also included.

FOR ALUMINUM SCHOOL SHOP PROJECTS

Open to all Junior and Senior High School Students

The purpose of this Schweizer Contest is for Students to conceive, plan and undertake the design of any practical, useful and economical product which can be produced in kit form, made up either wholly or in part from aluminum materials and adaptable to school shop or home construction.

Send for contest rules and regulations

CURRENT SCHWEIZER ALUMINUM SCHOOL SHOP PROJECTS

Utility Case Kit #1A — "Captain's Case" Kit #4 — Multipurpose Tray Kit #3

School Shop Teachers: Write for Official Entry Blanks for your entire class today.

SCHWEIZER AIRCRAFT CORP.
EDUCATIONAL DIV. ELMIRA, N.Y.

Gentlemen: Members of my class want to participate in your creative design contest.

☐ Please send ..... Official Schweizer Entry Blanks

☐ Send additional information on your other practical aluminum school shop projects.

Name .....

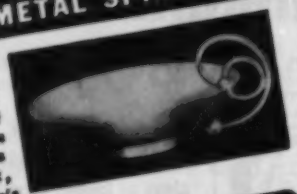
School .....

Address ..... City ..... State .....

..... Total number of students in your classes.

EVERY SCHOOL SHOP NEEDS THIS EQUIPMENT

FOR ADDING METAL SPINNING



If you have a good lathe in your shop, a few Boice-Crane spinning tools and accessories permit the instruction of metal spinning. If you have no lathe, Boice-Crane can supply a gap-bed lathe as well as the spinning tools. In any event, you should send for Boice-Crane's FREE instruction book on Metal Spinning.

FOR SAFER, EASIER, CLEANER SHAPING

TRU-FORM CUTTERS
(with involute relief)

Safer! Always cut true, original shape and dimensions. Improved clearance for high speed shaping throughout the 50% longer life of the cutter. Less cutting edge crumbling than straight relief cutters. Precision formed from uniformly deep-hardened fine tungsten tool steel. Razor sharp. Authentic pattern individual cutters and sets for all cabinet work, mill-work, windows, storm sash and doors.

FOR BETTER HAND TOOL MAINTENANCE

End tool sharpening troubles with the

Friction-Matic

DUAL WET GRINDSTONE

Any student can operate without the slightest danger of drawing the temper of costly shop edge tools, as so frequently happens with high speed dry grinders. Consists of two complete grinder units, one coarse standard Ohio sandstone wheel, and one high quality extra fine grain Arkansas-type wheel, driven by a single double shaft motor.

Constant speed. Positive, spring-loaded friction drive automatically speeds up the stone as stone wear occurs through use. The only grinder which by maintaining near-constant peripheral speed, guarantees the last grind as the stone to be as efficient as the first.

Grinds wet, but operator stays dry. Don't compare "Friction-Matic" with wet grindstones that throw water. Rubber friction roll drive automatically squeegees excess water from the wheel.

Comes complete with two grinding units, bench base, V-belts, V-pulleys and double end shaft ½ H.P. motor for 110-V, 60 cy., 1 phase, A-C. Shipping weight 90 lbs. Six other single unit models.

Free!

BIG NEW CATALOG ON BOICE-CRANE POWER TOOLS FOR CUTTING ★ SHAPING ★ DRILLING ★ FINISHING

FLEXIBLE—Readily adaptable to a wide range of projects.

SAFETY ENGINEERED—As nearly 100% safe as modern devices permit.

BUILT TO OUTLAST—Boice-Crane tools can take a beating which would incapacitate most machines.

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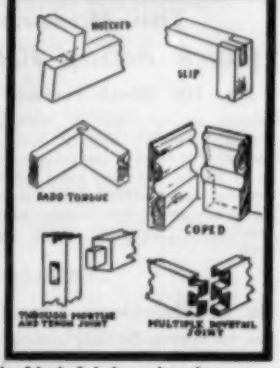

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TEACHING MATERIALS

(Continued from page 42A)

Grandma Goes to School, sound motion picture in color, 16mm.
Grandma goes to Town, sound motion picture in color, 16mm.
Fishin' For Fun, sound motion picture in color, 16mm.
Farmer of Tomorrow, sound motion picture in color, 16mm.
Oil Films in Action, sound motion picture in color, 16mm.
Safety Our No. 1 Crop, sound motion picture in color, 16mm.
The Bull Dog, sound motion picture in color, 16mm.
Lest We Forget, sound motion picture, 16mm.
Sand and Flame, sound motion picture, 16mm.
The Questing Mind, sound motion picture in color, 16mm.
Doctor in Industry, sound motion picture in black and white, 16mm.

Goodyear Tire and Rubber Company, Inc.
Motion Picture Department
Akron, Ohio

Airships, 16mm. sound
American Success Story, 16mm. sound
Arizona Story, sound 16mm.
Balloons, sound 16mm.
Camp Manatoc, 16mm. sound
Conquering the Jungle, 16mm. sound
Golden Valley, 16mm. sound
Jack Pines Run, 16mm. sound
Modern Coal Mining, 16mm. sound
Mules to Motors, 16mm. sound
From Nine to Noon, 16mm. sound
When Industry Plays, 16mm. sound
Rolling Wheels, 16mm. sound
Step On It, 16mm. sound
A Big Race for Little Wings, 16mm. sound

Hammermill Paper Company
Advertising Department
1646 East Lake Road
Erie, Pennsylvania

The Gift of TS'AI LU — Paper, 16mm. sound portions in color
Great White Trackway, 16mm. sound all color

Humble Oil and Refining Company
Humble Film Library, P. O. Box 2180
Houston 1, Texas

Hazardous Helper, 16mm. sound color
More Than Magic, 16mm. sound color
Oil, 16mm. sound color
Portable Well Servicing Unit, 16mm. sound color
Trouble Lurks Below, 16mm. sound color
Humble's Four Star War Products, 16mm. sound color
Thermal Forces, 16mm. sound color

Huyck and Sons, F. C.
Kenwood Mills
Albany 1, New York

Paper, Pacemaker of Progress, 16mm., sound color

Indiana Limestone Institute
Bedford, Indiana

The Nation's Building Stone, sound film, 16mm.

Institute of Makers of Explosives
250 East 43rd. Street
New York 17, New York

Blasting Cap, sound color, 16mm.

Insulation Board Institute
111 West Washington Street
Chicago 2, Illinois

Designed for Living, 16mm. sound color
The Professor was a Salesman, 16mm. sound color
Climate as You Like It, 16mm. sound color
Fundamentals of Building Insulation
Farm Building Insulation

International Paper Company
Southern Kraft Division
Mobile 9, Alabama

In Partnership With Nature, 16mm. sound color, available free of charge to schools, clubs, church groups, civic organizations, etc., from either the Mobile office, or 220 East 42nd Street, New York 17, New York

International Harvester Company
180 North Michigan Avenue
Chicago 1, Illinois

CR-308-C Film Catalog

Interstate Oil Compact Commission
P. O. Box 3127
State Capitol
Oklahoma City 5, Oklahoma

Oil For Tomorrow, 16mm. sound color

Kansas, University of
Bureau of Visual Instruction
University Extension
Lawrence, Kansas

Catalogue of 16mm. films and supplement

Kendall Refining Company
Bradford, Pennsylvania

Film Release No. 2 — Pylon Dusters, 16mm. sound and color film
Film Release No. 3 — Nature Plays Favorites, 16mm. sound and color film
Film Release No. 4 — Get the Lubrication and You Get the Service

(Continued on next page)

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WHAT ARE YOUR HIGH-SCHOOL SHOP'S ELECTRICAL REQUIREMENTS?

If you are planning a new shop or revamping your present one . . . for valuable suggestions, a shop layout plan, a list of fundamental requirements ... Send for Booklet #205 "Electrical Requirements for H. S. Electric Shops" (Industrial Arts level); Booklet #216 (Vocational & Technical School level).

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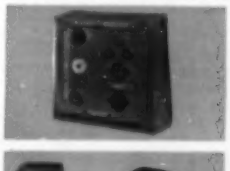

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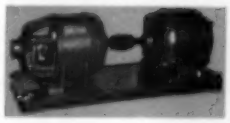
Other types furnished to meet requirements.



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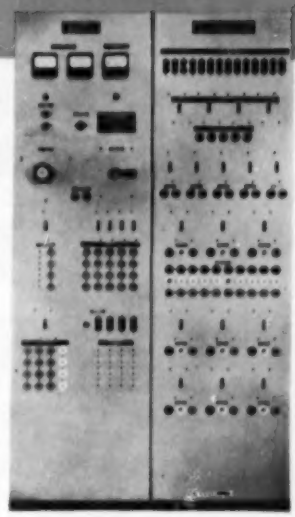

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TEACHING MATERIALS

(Continued from previous page)

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McGee Building
Oklahoma City, Oklahoma

Neptune's Oil Fields, 16mm. sound color
Thru Suez for Oil, 16mm. sound full color

Lion Oil Company
Public Relations Department
El Dorado, Arkansas

Revolution in the South, 16mm. sound color

Masonite Corporation
111 West Washington Street
Chicago 2, Illinois

Masonite Magic at Ukiah, 16mm. color and sound

Modern Talking Picture Service, Inc.
45 Rockefeller Plaza, New York
New York 20, New York

The following 16mm. motion films are available from Modern Talking Picture Service, free. Write Company for schedule blanks and other particulars. Sponsoring company's name is also shown.

Wheels Across India, 393, Chrysler Corporation
East of Bombay, 392, Chrysler Corporation
Wheels Across Africa, 391, Chrysler Corporation
Mystery of the Incas, 390, Chrysler Corporation
Wheels Across the Andes, 389, Chrysler Corporation
Land of the Kangaroo, 388, Chrysler Corporation
Wheels Across Australia, 387, Chrysler Corporation
Sporting Arms and Ammunition, 384, Olin Industries, Inc.
Beer Belongs, 383, The United States Brewers Foundation
Let's Train With the Cardinals, 382, Anheuser-Busch, Inc.
Jets Over Turkey, 379, Foreign Operations Administration
Piercing the Unknown, 378, International Business Machines Corp.
Million Dollar Castle, 377, National ASSN. of Home Builders
Operation Herbert, 371, American Medical Association
The Builders, 370, Wire Reinforcement Institute
Parakeets are Fun, 369, R. T. French Company
The Very Idea, 362, Crane Company
Big Scot, 360, Anheuser-Busch, Inc.
Bright New World, 358, Pittsburgh Plate Glass Company
Crusaders Against Fire, 357, National Automatic Sprinkler and Fire Control Assn.
Green Gold, 352, Republic Steel Corporation
Figure Forum, 350, The Warner Brothers Co.
Steel Frontiers, 344, Republic Steel Corporation
Beauty and the Bride, 343, S. C. Johnson & Son, Inc.
Where the Heart Is, 341, United States Savings & Loan League
This is The Way, 300, Bendix Home Appliances
New Worlds in Motion, color, 299, Chrysler Corporation
Tool and Die Making-Keystone of Mass Production, color, 294, National Tool and Die Manufacturers Assn.
Deep Roots, color, 291, Champion Paper and Fibre Company
A Better Start in Life, 288, Swift and Company
It's In The Air, 285, color, Chrysler Airtemp
The Cool "Hot Rod," 284, Socony-Vacuum Oil Company
Pigeonholes and Progress, 283, U. S. Post Office Department
The President Visits Williamsburg, 282, Colonial Williamsburg, Virginia
Powering America's Progress, 281, color, National Coal Association
New Horizons in Aluminum Brazing, 277, color, Aluminum Company of America
Welding Advances with Aluminum, color, 277, Aluminum Company of America
Once Upon the Wabash, 275, color, Wabash Railroad Company
The Magic Wheel, technicolor, 271, National Cash Register Company
Speaking of Rubber, 270, United States Rubber Company
Land Battleship, 264, color, Chrysler Corporation
Family of Craftsmen, 259, The Studebaker Corporation
The Studebaker Story, Technicolor, 258, The Studebaker Corporation
Beyond a Promise, 257, The Studebaker Corporation
Map of an Empire, color, 256, United Gas Corporation
Your Doctor, 236, American Medical Association
A Nation's Meat, color, 235, Swift and Company
The Magic Shelf, 225, color, Campbell Soup Company
The Light Touch, A New Way to Easier Ironing, 215, Celanese Corporation of America
From Every Mountain Side, 213, technicolor, New York Life Insurance Company

(Continued on page 48A)

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"It's Easy to Bend", an interesting 36 page book that shows how rods, straps and tubing are formed, tells how a single Di-Acro Bender is tooled for many operations.
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Ideal for Manual Training Shops, Woodworking Shops, Vocational Schools, etc., Where Size, Economy and Efficiency Are Highly Important Factors

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A larger unit with a capacity of 1050 cfm at 5260 fpm. It has a 6" outlet. It will efficiently handle several machines and more if used in conjunction with Ventomatic Air Control Valves. It features compliance with codes, large shaving and dust compartment, and an excellent filter arrangement which returns the clean air to the room without loss of heat.

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Heavy Bends, Direct on Center Pin; "U" Bends on Cam Dies, 3" x 7/16" flat or ⅞" Round or Square Cold
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TEACHING MATERIALS

(Continued from page 46A)

Background for Home Decoration, 208, color, WallPaper Council, Inc.
Flight to the Future, color, 207, Bakelite Company
The Big Little Things, 206, Cooper's, Inc.
All I Can Do, 205, Cooper's, Inc.
Better Typing — At Your Fingertips, 200, Smith-Corona, Inc.
Packaged Power, color, 199, Aluminum Company of Canada
The New Paul Bunyan, technicolor, 194, WeyerHaeuser Forest Products
North America Moves Ahead, 193, color, North American Van Lines
The Mark of "C", technicolor, 192, Bakery Products Dept., Anheuser-Busch, Inc.
Fine Tableware in the Making, 191, Doulton and Company
Pacific Islands of World War II, color, 190, Chrysler Corporation
The DuPont Story, technicolor, 188, E. I. Du Pont de Nemours & Company
Faith of Their Fathers, color, 187, Loyal Order of the Moose
Tank Ship, color, 186, The Texas Company
Bright Future, color, 184, General Electric Company
The Art of Keramos, color, 178, Gladding, McBean & Company
Right as Rain, color, 158, Aluminum Company of America
For Now and Forever, color, 164, Gladding, McBean and Company
Let's Talk Turkey, 155, color, Armour and Company
Your Festival of Cheese Recipes, color, 154, Armour and Company
Service Unseen, color, 153, Carrier Corporation
In Partnership with Nature, color, 151, International Paper Company
The Clean Look, color, 150, Armour and Company
Good Wrinkles, technicolor, 149, Calif. Prune and Apricot Growers' Assn.
This Is Life, color, 148, American Meat Institute
The Magic Box, color, 144, Folding Paper Box Assn. of America
Growth Industry, color, 137, Snow Crop Marketers
The Case of Tommy Tucker, 134, Chrysler Corporation
Wonderland of Vision, 133, color, Better Vision Institute
Spring Chicken Year 'Round and Easy as Pie, color, 130, Armour and Company
The ABC's of Beef Cookery with Can You Carve?, color, 129, Armour and Company
Your Frankfurter Favorites and Better Bacon, color, 128, Armour and Company
Search for Security, 125, Institute of Life Insurance
For Some Must Watch, 124, Institute of Life Insurance
American Portrait, 123, Institute of Life Insurance
The Big Kitchen, technicolor, 122, H. J. Heinz Company
The Growth of a Nation, 121, American Feed Manufacturers Assn.
The House That Faith Built, 117, Anheuser-Busch, Inc.
And Then There Were Four, 114, Socony-Vacuum Oil Company
Rainbow Harvest, color, 110, Dole Sales Company
Constant Challenge, color, 108, Union Oil Company of California
Big Tim, color, 106, Timken Roller Bearing Company

(Continued on page 50A)

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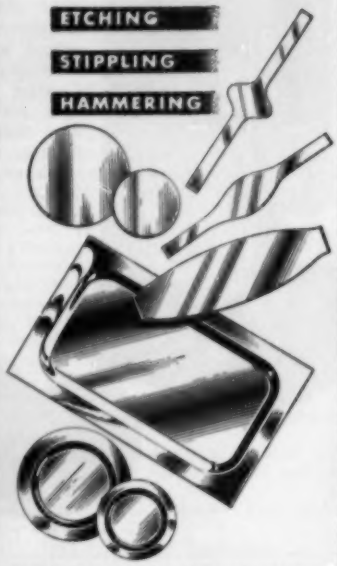

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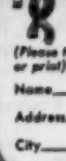

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CITY_____ STATE_____

TEACHING MATERIALS

(Continued from page 48A)

Magazine Magic, color, 105, Curtis Publishing Company
Research, Pattern for Progress, color, 104, The Texas Company
In Balance, 96, Burroughs Corporation
The Drama of Portland Cement, color, 95, Portland Cement Association
The Golden Touch, color, 91, Dole Sales Company
Realm of the Wild, color, 89, Olin Industries, Inc.
Whistling Wings, color, 88, Olin Industries, Inc.
Pheasants Galore, color, 87, Olin Industries, Inc.
The Cheese Family Album, color, 84, Kraft Foods Company
The Magic Touch, color, 83, Wood Office Furniture Institute
Every Seventh Family, 79, National Consumer Finance Association
Treasure Islands, color, 78, Dole Sales Company
Valiant Years, 71, Associated Serum Producers, Inc.
Curiosity Shop, technicolor, 70, Aluminum Company of America
Winning Seals of Approval, color, 57, American Gas Association
From Good Earth to Good Tables, color, 53, Green Giant Company
Candy and Nutrition, 50, National Confectioners' Association
The Child City, 45, Loyal Order of the Moose
Unfinished Rainbows, 28, technicolor, Aluminum Company of America
Scrub Game, 21, Procter & Gamble Company
Barley, Miracle Grain of the Modern World, color, 859, Froedtert Grain and Malting Company, Inc.
Steel with A Thousand Qualities, 814, color
Lubricating Oil's Amazing Molecules, 18 minutes, color
Gasoline's Amazing Molecules, 22 minutes, color
Men and Oil, 21 minutes, black and white
Paper Work, 30 minutes, color
Decision for Chemistry, 35 minutes
Pioneer of Progress, 15 minutes, black and white
The Nickel Plate Story, 20 minutes, color
Trees to Tribunes, 40 minutes, color
Crystal Clear, 28 minutes, color
Opportunity U.S.A., 27 minutes, black and white
You Can Take It with You, 27 minutes, color
The Legend of Dan and Gus, 26 minutes, color
Green Harvest, 29 minutes, technicolor
America's First Silverplate, 25 minutes, color
Enterprize, 31 minutes, color
Now We Know, 20 minutes, black and white
Pipe Line Pioneer, 20 minutes, color
Homes Unlimited, 29 minutes, color
Play Ball With the Yankees, 30 minutes, black and white
The Making of a Yankee, 18 minutes, black and white
A Fortune in Two Old Trunks, 25 minutes, color
Time — The Servant of Man, 20 minutes, black and white
24 Hours of Progress, 28 minutes, black and white
In the Beginning, 28 minutes, color
Good Business, 30 minutes, color
In These Hands, 26 minutes, color
The Next Step, 32 minutes, color
The Miracle of the Can, 41 minutes, color
225,000 Mile Proving Ground, 19 minutes, color
Fine Cameras — And How They are Made, 28 minutes, color
Sugar U.S.A., 28 minutes, color
What Makes Us Tick, 12 minutes, technicolor
Beauty That Lives Forever, 22 minutes, color
Decision, 28 minutes, color
Big Idea, 30 minutes, black and white

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85 John Street
New York 38, New York

Twenty-five current fire prevention films suitable for showing in schools, clubs and other community audiences

National Board of Fire Underwriters
465 California Street
San Francisco 4, California

(send requests for film bookings to: National Board of Fire Underwriters Film Library, Bureau of Communication Research, Inc., 13 East 37th Street, New York 16, New York

Approved by the Underwriters, 16mm. black and white
Before the Alarm, 16mm. and 35mm. black and white
Chemistry of Fire, 16mm. black and white
Crimes of Carelessness, 16mm. and 35mm. black and white
Danger Sleuths, 16mm. black and white
Fire and Your Hospital, 16mm. black and white
Fire Fighting for Householders, 16mm. black and white
Fire on the Farm, 16mm. black and white
Heating Safely, 16mm. color and black and white
Heroine of the Week, 16mm. color and black and white
How to Call The Fire Department, 16mm. black and white

(Continued on page 53A)

ELECTRONICS...

easy to teach ...easy to learn

with the New, LOW COST

Crow Basic Electronics Kit...Model 50-A

YOU TEACH BY VISUAL EXPERIMENT —YOUR STUDENTS LEARN BY DOING

● Here's another important "first" from Crow Electri-Craft—electronics by visual experiment! This unique new kit is designed for students who have completed the Beginners' Electricity course with Crow Electri-Kit Model 41-B or equivalent training. It permits them to advance immediately into the study of electronics. They learn by doing; that is, they verify electronic principles by building their own operating assemblies . . . the most fascinating and effective instruction method ever devised.

Model 50-A contains 82 precision-made components—everything needed to perform 60 experiments in electronic fundamentals. A 275-page, illustrated manual in worksheet form is also included. It guides students step-by-step . . . shows what parts are needed for each assembly, how to set it up, and how the theory involved is put to practical use.

This Basic Kit provides a solid foundation for further training in specialized electronic fields—Radio Transmitting and Receiving, Industrial Electronic Circuitry, or Basic Radar and Television Circuitry. All of these principles are covered in the Crow Electronic Tubes, Circuits and Devices Kit (Model 53) available soon.

60 Operating Assemblies

Capacitors • Voltage Dividers • Vibrators
Frequency Discriminators • Filters
Frequency Multipliers • Resonant Circuits
Electrical Indicating Instruments
Rectifiers • Fly-back Voltage Supply Principles

Crow Basic Electronics Kit Model 50-A
82 parts including precision meter (±1%), precision resistors, coils, potentiometer, rectifiers, capacitor bank, etc., plus 275-page manual. All parts mounted for use with "Kwik-Klip" solderless connectors. Supplied in sturdy corrugated case.....$57.50

Hardwood Carrying Case
For Model 50-A. Has pegboard top and clip hinges. Can be used as baseboard for experiments.....$0.75

Crow Basic Electronics Kit Model 50-B
For those who already own Model 41-B Electri-Kit. Same as Model 50-A (above) with all 41-B components omitted...$37.50

Write for bulletin describing CROW Basic Electronics Kit Model 50-A.

BUILD YOUR ELECTRICAL AND ELECTRONIC COURSES AROUND CROW EQUIPMENT

CROW ELECTRI-CRAFT CORP.

Division of Universal Scientific Co., Inc.
Box 3205, Vincennes, Indiana

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FOR SCHOOL SHOP PROJECTS!

Colored Plexiglas Assortments

in translucent, opaque and transparent reds, blues, greens, greys, whites and others.

NEW LOW PRICES — IMMEDIATE DELIVERY

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20 Lbs..... $17.00
40 Lbs..... $30.00
100 Lbs..... $70.00

Finest quality and the best colors in all new, flat, paper-masked Plexiglas. Sizes 6" x 12" and larger in the assortment. Dyes and cements available.

3 FREE BOOKLETS: How to Work With Plexiglas — How to Work With Vinylite — Conversion Table and Chart

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727 Lake Street, Chicago 6, Ill.
2305 Beverly Blvd., Los Angeles 57, Calif.
2111 Olive Street, St. Louis 7, Mo.

OU WILL FIND STERLING FLASKS IN MORE THAN 4500 FOUNDRIES

The above stack molding technique was made possible by using Sterling flask sections to step up casting production. Ten flask sections are being poured at a time. A common sprue through the stack feeds the molten metal to runners leading to individual castings cavities.

Sterling Steel Flasks are ideal for stack molding because they are built to withstand terrific pressures. A reinforcing rib around the side prevents distortion and misalignment of stacked molds. Top and bottom have solid sand flanges. Full width bearing.

Write for new catalog describing the complete Sterling line.

STERLING WHEELBARROW CO. Milwaukee 14, Wis., U. S. A.

Send for new free catalog

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Lock Drawer No. 336

Paris, Illinois

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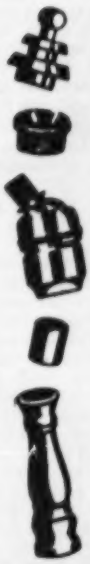
LAMP PROJECTS

Of particular interest to instructors — in woodworking, general shop, plastics, crafts, electricity, and many other shop courses. Students can design and make the body of the lamp. We supply all other parts necessary—sockets, cords, plugs, shades, harps, switches, etc. Over 700 different parts shown in wholesale catalog. A MUST for all instructors occupied with highly educational and useful projects. Send 25¢ today for wholesale price list and parts catalog.



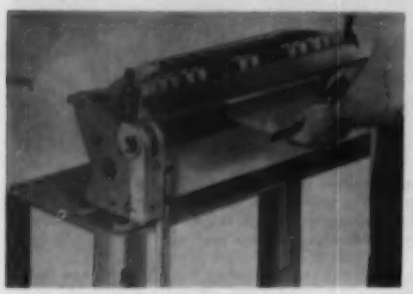
THE GEARON COMPANY

Dept. 100-K-10 • 27 S. Desplaines St. • Chicago 6, Ill.

Shop Equipment News

DI-ACRO SPARTAN PAN BRAKE

A newly designed 24-in. school Box and Pan Brake with undercut box fingers and a 1-in. opening between box fingers and bottom plate is announced by O'Neil-Irwin Manufacturing Company.



Box Finger Bar on the new Spartan Model Di-Acro Box and Pan Brake

Designated Spartan Model No. 24 — DiAcro Box and Pan Brake, the principal advantage of the undercut box fingers, is that it allows radio chassis and boxes with a lipped edge to be formed. Boxes as deep as 2½ in. with a ½-in. lip across the top can be formed.

The 1-in. clearance between the box fingers and the bottom plate make for easy insertion or removal of material. This feature is said to prove particularly useful when forming compound bends in sheet material.

A special brake has been put on the mechanism for raising and lowering the top forming bar to prevent it from suddenly dropping and injuring the operator's hands and fingers.

The segmented box fingers are mounted from the front side of the mounting bar so that they can be rapidly removed and rearranged to cover the entire box forming range from ¾ in. to 24 in. in steps of ¼ in.

Radius bends can be made by moving the box fingers back from the center line of forming to allow the material to form a natural radius.

Material capacity of the new brake is 16-ga. mild steel.

(For Convenience Circle Index Code 0801)

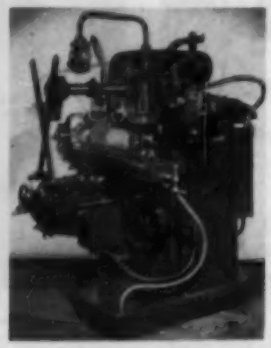
NEW KNEE TYPE MILLING MACHINES

Brown & Sharpe Mfg. Co. is presently introducing the new "Rangemaster" No. 20 Universal and No. 20 Plain Milling Machines — Sliding-Head Type.

The extremely wide work range and versatility of this machine will be of value in many fields. Metal patternmakers will appreciate its work range. The ability to change quickly from horizontal to vertical and angular milling will appeal to mold and die workers.

The design of this machine is characterized by a sliding head mounted on wide ways on the top of the column. Both horizontal spindle and fully universal milling head spindle are provided on the sliding member.

Eighteen spindle speeds are available for each spindle, from 40 to 1530 r.p.m. for the main spindle, and from 80 to 3060 r.p.m., for the spindle of the universal head. As each



No. 20 Rangemaster Universal and Plain Milling Machines

spindle has a No. 40 Milling Machine Standard taper nose, cutter equipment is interchangeable.

Eighteen feed rates, from ½ to 20¼ in. per minute, are available for longitudinal, transverse, or vertical feed of the table. In addition, the spindle of the universal head can be fed axially 3½ in. by hand.

(For Convenience Circle Index Code 0802)

KWIK-SAND "ROTO-5"

Creative Products Company have recently produced a new tool, the Kwik-Sand "Roto-5" which will be found useful in the home or farm workshop, or in the small service shop, and the school shop.

Kwik-Sand "Roto-5" used on a drill press

Kwik-Sand "Roto-5" uses a standard 5-in. abrasive disk which quickly puts a professional finish on projects of wood, metal, plastics, etc.

With Kwik-Sand, it takes only seconds to change from a coarse to a fine grit abrasive or vice versa for sanding, to apply a special abrasive for tool sharpening, or to attach a lamb's-wool bonnet for buffing.

(For Convenience Circle Index Code 0803)

PROTO ALL-ANGLE DRILL

The PROTO all-angle drill was designed to solve difficult drilling problems for both professional tool users and home mechanics. Since both the chuck and handle are adjust-

Proto All-Angle Drill

able to various angles, the drill will reach around obstructions, work close to floors and walls, and operate in close quarters.

The 0 to ¼-in. capacity chuck swings in a 270-degree arc, and has a spring lock that enables the user to change angles with a flip of the thumb. The handle turns in a 180-degree arc at right angles to the chuck movement path. It is held in its several positions by an adjusting screw. Storage space is provided in the hollow handle for a large number of drills.

The long metal handle is painted red, and the other metal parts are plated to resist corrosion and enhance the over-all appearance. The drill, identified as No. 370, is patented.

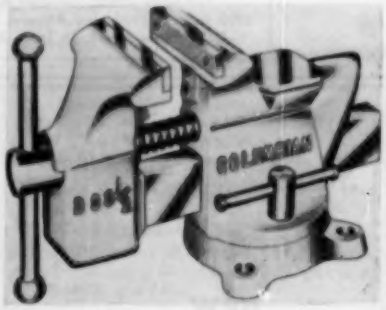
Plomb Tool Company.

(For Convenience Circle Index Code 0804)

NEW COLUMBIAN HOMESHOP VISES

The Columbian Vise & Mfg. Co. announces the production of two new homeshop vises.

Known as Nos. D33½ and D63½, they have 3½-in. jaw widths and jaw openings of 4 in. Their pipe capacity is ⅛ to 1¼ in. Each vise weighs 13 lb.



New D33½ Columbian Vise

No. D33½ is equipped with knurled replaceable steel jaw faces. No. D63½ has smooth faces to prevent the marring of aluminum or other soft surfaces.

An outstanding feature of both vises is their *3 point* Tri-Grip permanent pipe jaws. Cast integrally with the vise front and back sections, these are said to provide a more positive grip than is possible with other designs. Additional features, listed by the manufacturer, include extra heavy steel beams, cold rolled steel screws with slip-proof collars, handle balls forged from handle stock and positive locking swivel base with slip-handle lock nut.

(For Convenience Circle Index Code 0805)

STACOR'S 1955 CATALOG

A revised catalog, issued by the Stacor Equipment Company, features the versatility of the entire Stacor line of Lifetime Steel Equipment. This includes drafting room furniture, drawing, tracing and X-ray equipment, and several new products not previously shown.

The catalog illustrates, describes, and gives specifications for Stakmaster 4- and 5-drawer

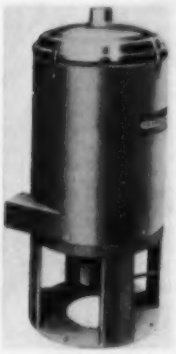
files, Multimaster tables, Planmaster sectional steel filing cabinets, Draftmaster drafting tables and accessories, Thriftmaster drafting tables, Tracemaster tracing tables, taborets and X-ray film filing cabinets.

The catalog is planned to give readers complete working knowledge of Stacor Steel Equipment and to show them how the various units are adaptable to specific business and industrial needs.

(For Convenience Circle Index Code 0806)

NEW CRAFTOOL DUST COLLECTOR

Craftools, Inc., announce a Dwarf Dust Collector Unit for application on small machines where dust presents a special problem, as in school shops, laboratories, tool rooms, etc.



Craftool Dwarf Dust Collector Unit

The Dwarf Dust Collector handles 230 cu. ft. of air per minute and separates the dust so that the heavy particles are retained in an expansion chamber while fine dust is collected in a filter bag.

The unit is designed so that one or two machines can be connected with the collector.

Attachments are available that convert the unit into an ideal vacuum for maintaining and cleaning all machines in the shop. A set of casters are also available for making the unit mobile.

(For Convenience Circle Index Code 0807)

KODAK PAMPHLET ON COLOR SLIDE SEQUENCES

Suggestions for the preparation and effective use of color slide sequences in educational presentations are embodied in a new Eastman Kodak revised pamphlet.

The leaflet stresses the advantages of such a sequence of 2 by 2-inch slides. It is simple to make, flexible in use, and can be shown to a widely varying number of people, from one person to a large audience.

Copies of the 8-page "Notes on Color Slide Sequences as Aids in Business and Education," punched to fit the Kodak Photographic Notebook, are available without charge from the *Sales Service Division, Eastman Kodak Company.*

(For Convenience Circle Index Code 0808)

MODEL 12-16W WOOD TURNING LATHE

The Haag Machine Co., Inc., recently announced their new Model 12-16W wood turning lathe.

The headstock of this lathe is enclosed. The spindle runs in sealed ball bearings.

The lathe swing is 12 in. over the bed, and 16 in. in the gap. The capacity is 12 in. between centers. The speed is infinitely variable from 500 to 3000 r.p.m.

It is powered by a ½-h.p. ball bearing motor.

The lathe is stanchly built and is ideally suited for metal spinning.

(For Convenience Circle Index Code 0809)

WE ARE SORRY

Unfortunately one of those troublesome typographical errors crept into the Sterling Wheelbarrow Co's. advertisement on page 48A in the September, 1955, issue of this magazine.

The offending sentence "They *present* run outs" should read, "They prevent run outs."

TEACHING MATERIALS

(Continued from page 50A)

How to Fight a Fire in the Kitchen, 16mm. black and white

Stop Fires — Save Jobs, 16mm. and 35mm. black and white

Stupid Carelessness, The Fire Clown, 16mm. color and black and white

Texas City Comes Back, 16mm. black and white

The Happy Chief, 16mm. color and black and white

The Magnolia Story, 16mm. color and black and white

The Torch, 16mm. color and black and white

The Wind and the Fury, 16mm. color and black and white

Then It Happened, 16mm. color

These are the Facts, 16mm. and 35mm. black and white

Tony Learns About Fire, 16mm. color and black and white

Train we Must, 16mm. color and black and white

Trees for Tomorrow, 16mm. black and white

Until the Fire Department Arrives, 16mm. black and white

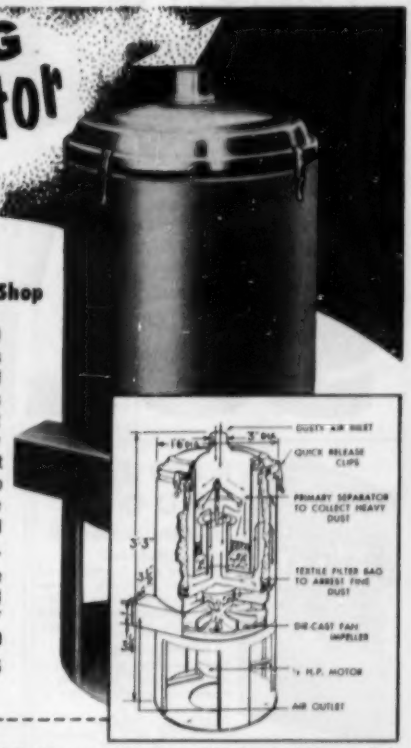
National Association of Plumbing Contractors
1016 20th Street
Washington 6, D. C.

Moulders of Progress, 16mm. color sound

Apprentice Training, 16mm. black and white sound

(Continued on next page)

The New B-G Dust Collector

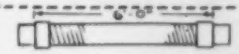


Helps Eliminate Dust Hazard in the Shop

A giant in performance, capable of handling 230 cu. ft. of air per minute. Dust separation takes place in 2 stages, with heavy particles retained in an expansion chamber while fine dust is collected in a filter bag. Specially designed cast aluminum impeller enables maximum efficiency to be obtained from a ½ h.p. ball-bearing jet motor. Can be connected with one or two machines, and adapted to any machine by the use of simple standard hoods. Makes an ideal vacuum for cleaning all machines in the shop.

No. 201 B-G Dust Collector Unit, complete with ½ h.p. 120 V. 1-phase-60 cycle ball bearing motor, switch and 6 ft. of 3" flexible hose **$198.50**

No. 1997 Set of 4 Casters..... **$3.75**



No. 310

No. 311A

FITTINGS

No. 310 Flexible composition reinforced 3" diameter tubing supplied in 6 ft. lengths complete with end connectors, standard lengths of hose can be joined in multiples of 6 ft. Per 6 ft. section....**$12.00**
No. 311 'Y' Piece Connection with damper..... **$14.00**
No. 311A 'Y' Piece Connection without damper..... **$11.00**
No. 312 Standard Elbow..... **$ 3.50**
No. 313 Control Damper supplied in any size and suitable for connecting to Nos. 310, 311, 311A or 312..... **$ 4.00**

DUST HOODS

No. 314

No. 314 Standard Universal type suitable for surface grinders, etc. **$10.50**

No. 315 Square type universal hood suitable for tool and cutter grinders, saw tables..... **$10.50**

No. 316

No. 316 High velocity fish tail nozzle for woodworking machines.... **$10.50**

No. 317 Round pointed nozzle for shop cleaning. **$4.00**

MISCELLANEOUS

No. 318 Horizontal 3" inlet cover..... **$8.00**
No. 319 Vertical 3" inlet cover..... **8.00**

Write for new 1955 catalog

BRODHEAD GARRETT CO.

50 Years Serving School Shops of America

4560 E. 71 ST. CLEVELAND 5, OHIO

KESTER

Preferred in classrooms from coast to coast because it's the same fine solder they'll be using when they graduate!

Write for free Kester Solder booklets...both Instructor and Student editions.

KESTER SOLDER COMPANY
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Newark 5, New Jersey • Brantford, Canada

SOLDER

PROJECT BOOKS

MAKING THINGS OF PLASTIC
Describes and illustrates all processes. Abounds in projects from cuff links to furniture pieces. EDWARDS $3.75 (#1 in coupon).

BIRD HOUSES
The complete project book on the subject! Hundreds of variations possible from 17 basic patterns. PERRY & SLEPICKA $1.75 (#2 in coupon).

MAKING THINGS OF WOOD
NEW — early 1956 publication. A project book providing a wealth of learning-by-doing experience. SOETEBEER and MOORE (#3 in coupon).

THE ART OF WOODTURNING
Gives simple, definite instructions for every operation in lathe work. Contains 70 fine projects. KLENKE.....$3.85 (#4 in coupon).

THE ART OF TILE SETTING
The only up-to-date book on tile setting! Covers all steps . . . leads to professional results. CARLS & WINES.....$3.75 (#5 in coupon).

BOATS, AIRPLANES AND KITES
One of the most appealing books ever published. Every project has been thoroughly tested. LeBERGE.....$2.50 (#6 in coupon).

INDUSTRIAL ARTS WOODWORKING
1953 Revised. FEIRER.....$2.96 (#7 in coupon).

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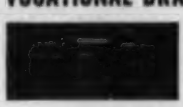
815 Duroc Bldg., Peoria, Ill.
Send book(s) circled:

1 2 3 4 5 6 7 ☐ $.....enclosed.
☐ Send C.O.D. ☐ Send on exam.
☐ Send FREE SCHOOL SHOP BOOKS CATALOG

Name .....
Address .....
City..... State.....

IMPORTED VOCATIONAL DRAWING SET



No. 711 8 Pc. Combination Bow Drawing Set. Velvet Lined, 2-Button Case.
$2.65 Ea. $30.80 Dz.

Subject to Educational Discounts
ORDER TODAY!
SEND FOR **FREE** 60-PAGE CATALOG

ALVIN & COMPANY
853 Palisade Ave.
WINDSOR, CONN.
ALVIN

TEACHING MATERIALS

(Continued from previous page)

New Jersey, State of
Department of Labor and Industry
Bureau of Engineering and Safety
Trenton, New Jersey

List of 35mm. sound slides

Learn and Live, 15 minutes
Giant Hands in Industry, 15 min.
The Fire Thief, 20 min.
Woven With Safety, 15 min.
Safe Handling of Materials, 10 min.
Keep it clean, 15 min.
No Laughing Matter, 15 min.
Packed With Safety, 15 min.
The Fall Guy, 19 min.
Handle with Care, 17 min.
Open for Infection, 19 min.
Safe All Around, 20 min.
Fire, 19 min.
Rules for Tools, 20 min.
My Eye Deal, 10 min.
Laboratory Glassware, 10 min.
Invisible Red Ink, 20 min.
Construction Equipment Safety, 20 min.
Woodworking Machinery, 17 min.
Timber, 17 min.
Sawmill Safety, 17 min.
Safety in Hand. 20 min.
Follow the Leader, 20 min.
Cause and Cure, 20 min.
Guard Duty, 20 min.
Safety is in Order, 20 min.
Brain Beats Brawn, 20 min.
Right Dress, 20 min.
Doctor's Orders, 20 min.
Principles and Interest, 20 min.
Stop, Look and Listen, 20 min.
Production With Safety, 20 min.
The Purpose of First Aid, 9 min.
Shock, 6 min.
Unconsciousness, 13 min.
Common Emergencies, 9 min.
Minor Injuries, 14 min.
Wounds (Part I), 9 min.
Wounds (Part II), 9 min.
Dressings & Bandages (Part I), 9 min.
Dressings & Bandages (Part II), 9 min.
Burns, 9 min.
Poison, 8 min.
Fractures (Part I), 13 min.
Fractures (Part II), 12 min.
Fractures (Part III), 15 min.
Moving the Injured (Part I), 9 min.
Moving the Injured (Part II), 9 min.
Power Press Guard No. 201 (silent-color), 15 min.
Power Press Guarding No. 202 (silent-color), 18 min.
Woodworking Machine Guarding (silent-color), 16 min.
The Chemistry of Fire, sound, 40 min.
How Fires Start in Industry, color, 30 min.
Fight That Fire (color), 12 min.
Handle with Care, 20 min.
The Air We Breathe, 25 min.
Factory Safety, 10 min.
For Safety's Sake, 15 min.
Organization, 11 min., 1
Machines, 8 min., 2
Handling, 5 min., 3
Falls, 5 min., 4
Safe Clothing, 7 min., 5

New York Times, The
Office of Educational Activities
Times Square
New York 36, New York

Fact Sheet on The New York Times Current Affairs Filmstrips

Ohio Oil Company, The
539 S. Main Street
Findlay, Ohio

Unseen Horizons, 16mm. sound color

(Continued on next page)

DO YOU USE THESE DELKOTE PRODUCTS?

DELKOTE® WOOD LACQUER is a unique new formulation, which embodies the best in modern lacquer technology. No finer finish is used—even on the highest priced furniture and the best pianos. Yet this lacquer is so formulated that it can be sprayed from an aerosol can!

Now your shop students can easily finish their handiwork with a professional-type lacquer. Two light coats, a little rubbing and polishing, give a deep, rich, long-lasting finish. This new aerosol product makes lacquer actually *easier to use than varnish.*

DELKOTE WOOD LACQUER was just introduced this past spring; yet it is already in use in hundreds of school shops and by maintenance personnel, home handy men, and hobbyists as well. Available in 12-ounce aerosol spray cans at $1.95 each, also in cartons of 12.

DELKOTE METAL LACQUER is a companion product, introduced at the same time. It is formulated to spray perfectly from the aerosol package, and is nonreactive to any metal surface.

It protects, preserves, and beautifies copper, brass, bronze, and aluminum. It prevents tarnishing. It eliminates the need for frequent polishing of hinges, doorknobs, stair rails, and fixtures. A useful material in the shop, it is also being used in school maintenance, office, and home . . . wherever brightwork is a problem.

Like DELKOTE WOOD LACQUER, the METAL LACQUER comes in 12-ounce self-spraying aerosol cans at $1.95 apiece, and in cartons of 12. Mixed cartons are available on special order.

55-V-1

Both DELKOTE WOOD LACQUER and DELKOTE METAL LACQUER are sold by leading school supply distributors. If your regular supplier does not carry them, order direct.

DELKOTE, Incorporated
Box 1335, Wilmington 99, Del.
Box 574, Berkeley, California
Also makers of BOOK-SAVER, BOOKOTE and DEL-FIX

TEACHING MATERIALS

(Continued from previous page)

Oil Industry Information Committee
630 Fifth Avenue, Rm. 2010
New York 20, New York

24 Hours of Progress, 16 and 35mm. sound black and white
24 Hours of Progress, 16 and 35mm. sound
The Story of Colonel Drake, 16mm. or 35mm. sound technicolor
American Frontier, 16mm. or 35mm. sound or black and white
Crossroads, U.S.A., 16mm. or 35mm. sound black and white
Man on the Land, 16mm. or 35mm. sound technicolor
It Never Rains Oil, 16mm. or 35mm. sound technicolor

Pacific Coast Gas Association
447 Sutter Street
San Francisco, California

The Miracle Flame, 16mm. sound color

Richfield Oil Corporation
Richfield Building
Los Angeles 17, California

Years Ahead, 16mm. sound color

Santa Fe Film Bureau
316 Railway Exchange
80 E. Jackson
Chicago 4, Illinois

Indian Ceremonials, 16mm. sound kodachrome
Along the Santa Fe Trail, 16mm. sound and color
Arts and Crafts of the Southwest Indians, 16mm. sound and color
Arizona Holiday, 16mm. sound and color
Chicago, 16mm. sound and color
El Navajo, 16mm. sound and color
Grand Canyon, 16mm. sound and color
Land of Pueblos, 16mm. sound and color
Navajo Sandpainters, 16mm. sound and color
A Picture is Made, 16mm. sound and color
Southern California Holiday, 16mm. sound and color
Sports of the Southwest, 16mm. sound and color
Super Chief, 16mm. sound and also color
Texas, The Big State, 16mm. sound and color
Wheels A'Rolling, 16mm. sound and color

Shell Oil Company
50 West 50th Street
New York 20, New York

Prospecting for Petroleum, 16mm. sound color
10,000 Feet Deep, 16mm. sound black and white
Oil From the Earth, 16mm. sound black and white
Lever-Age, 16mm. sound black and white
Birth of An Oil Field, 16mm. color and sound
Crude Oil Distillation, 16mm. sound black and white
Refining Oil For Energy, 16mm. sound color
Harnessing Liquids, 16mm. sound black and white
Oil For Aladdin's Lamp, 16mm. sound black and white
Screw Drivers and Screw Jays, 16mm. black and white sound
Oil — The Invisible Traveler, 16mm. color sound
Pipeline, 16mm. color sound

Society for Visual Education, Inc.
1345 Diversey Parkway
Chicago 14, Illinois

Educational Filmstrips, slidesets and Equipment, catalogue

(To be continued)

The 12 Top

a. t. s. Industrial Arts and Vocational Training *Texts*

Practical, Accurate, Easy-to-Grasp explanations of

PRINCIPLES AND PRACTICE

Systematized for { **CLASSWORK** / **REFERENCE** / **REVIEW**

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Personal News

DR. L. H. DENNIS DIES

Dr. Lindley H. Dennis, outstanding vocational education leader, died at Georgetown University Hospital, Washington, D. C., on August 5, at the age of 74. He served as executive secretary of the American Vocational Association for 17 years and during that time was instrumental in establishing the AVA as the authoritative voice of vocational educators throughout the country.

Born in Dover, N. H., Dr. Dennis was a graduate of State Teachers College, Bloomsburg, Pa. He received his master's degree from Columbia University and his doctor's degree from John Brown University in Arkansas.

Dr. Lindley H. Dennis

From 1912 to 1933 he served with the State Department of Public Instruction in Pennsylvania, becoming State Director of Vocational Education in 1925. He also served in that capacity for the state of Michigan in 1933–34.

From 1923 to 1925, Dr. Dennis was president of the National Society for Vocational Education, which joined forces with the Vocational Education Association of the Midwest to form the AVA in 1925.

Always active in the affairs of the AVA, Dr. Dennis became its first full-time executive secretary in 1934, when AVA headquarters were established in Washington, D. C. He carried out his duties with distinction until his retirement in 1950.

Dennis was associated with every federal vocational education act. A member of the original group that drafted the Smith-Hughes law, he was an active chairman of the AVA Legislative Committee for many years. His development of a nationwide movement in support of federal funds for vocational education led to the enactment of two vocational education laws — the George-Reed Act of 1929 and the George-Ellzey Act of 1933.

Two important advances in federal appropriations for vocational education, the 1936 George-Deen Act and the 1946 George-Barden Act, reflect his constant attention to legislation.

Following his retirement from the AVA in 1950, Dr. Dennis acted as consultant in vocational education, including service for the United States Department of State. In his consultative capacity, he visited Syria, Italy, France, Turkey, Iceland, Germany, England, Egypt, Switzerland, and Iraq. He also lectured on vocational education in many colleges and universities throughout the United States.

A member of Alpha Zeta Fraternity, honorary organization in the field of agriculture, he had served for many years as high treasurer and general secretary, as well as a member of its High Council.

Surviving Dr. Dennis are his wife, Dorothy A.; a son, L. H. Dennis, Jr., of Denver, Colo., and two grandchildren. Burial was in Trevorton, Pa., on August 9.

ROBERT W. TARBELL RETIRES

June 30 saw the retirement of one of the pioneer teachers in vocational education in Wisconsin. Robert W. Tarbell came from a rural community in northern Illinois. In his youth the standard work week was sixty

Robert W. Tarbell

hours, and home chores were attended to before and after. High school completion came at the age of 18, along with summer vacation at farming, cement works, section hand, and tile and brick manufacture.

(Continued on next page)

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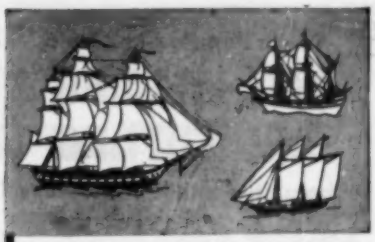

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PERSONAL NEWS

(Continued from previous page)

College education included Knox College, Northwestern University, Armour Institute of Technology, University of Wisconsin, Wisconsin State College at Milwaukee, Marquette University, Milwaukee, and the University of Chicago. The degree of bachelor of science was awarded by Marquette University, and the degree of master of arts was awarded by the University of Chicago.

Other industrial experience included machine shops, foundry, wood mill, etc., and about two and one-half years as a locomotive fireman.

Following this railroad experience Tarbell was appointed an instructor in a railway school and traveled on four railroads instructing railway engine men, trainmen, and shopmen in the technical phases of their work, preparatory to examination for promotion.

The next school job was as instructor for three years in the American School, Chicago.

Following that experience Mr. Tarbell came to Kenosha, Wis., in the fall of 1912, as the first Director of the Kenosha Vocational School. This was pioneer work, with the beginning of the Vocational School program in Wisconsin. Organizational work, teaching, curriculum planning and employer contacts for two years in Kenosha laid the foundation for the next position which was as a faculty member of the Milwaukee Vocational and Adult Schools. This work began in 1914. Over the years it included a considerable amount of teaching and supervision of apprentice classes and other groups.

Part-time assignments included a summer session teaching vocational education classes

(Continued on next page)

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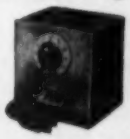

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PERSONAL NEWS

(Continued from previous page)

at the University of Wichita, a summer session at State College, Oshkosh, Wis., teaching similar classes, and several years training shopmen for teachers of vocational education classes at the University of Wisconsin in Milwaukee. This latter was in evening classes.

In addition to these formal activities in the field of teaching, Mr. Tarbell has written numerous articles on vocational education subjects and has been busily engaged in civic affairs.

Forty-one years as a member of the faculty of the Milwaukee Vocational and Adult Schools has given Mr. Tarbell the opportunity to witness the growth of a large institution and to have a hand in its development. For many years he has been vice-principal. He goes into retirement with many interests and activities to keep him busy.

ROY R. VAN DUZEE DIES

Roy R. Van Duzee died Friday, May, 20, after an extended illness.

He became director of the West Allis School of Vocational and Adult Education, West Allis, Wis., in 1941 after being supervisor of industrial arts for the suburb's school system. He taught industrial arts at West Allis Central High School 18 years before 1941.

Roy R. Van Duzee

Mr. Van Duzee was born in Menomonie, Wis., and was a graduate of The Stout Institute, and also held a master's degree in industrial education from the University of Wisconsin. Before coming to West Allis 32 years ago, he taught at schools in Bismarck and Minot, N. Dak.

Mr. Van Duzee was appointed by President Truman in 1952 to represent the Milwaukee area at a conference on industrial safety at Washington, D. C. He was a frequent contributor to the literature of his profession.

Mr. Van Duzee was a past secretary of the Wisconsin Education Association and a former secretary-treasurer of the Wisconsin Association of Vocational and Adult Education. He formerly was an adviser on the West Allis Industrial Safety council, president of the West Allis Teachers' Association, and head of the Wisconsin Industrial Arts Association.

He also was a member of the American Vocational Association, and the Industrial Relations Association of Milwaukee County.

At the time of his death, he was president of the West Allis Rotary Club and chairman of the building planning committee of the West Allis YMCA. He was a member of the Phi Delta Kappa and Epsilon Pi Tau, industrial arts fraternities.

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VICTOR SCHMITT APPOINTED DIRECTOR

Victor Schmitt, administrative supervisor of the evening division of the West Allis Vocational and Adult Education School, West Allis, Wis., has been named director of that school. He takes the place of Roy Van Duzee, who died recently.

Victor H. Schmitt

Mr. Schmitt is a graduate of Washington High School and received his Bachelor of Education Degree from Wisconsin State College at Milwaukee in 1935. He received his Master's Degree from the University of Wisconsin in 1950.

Mr. Schmitt has been in the vocational school since 1936, and supervisor since 1949. He is a native of Milwaukee.

Jess Le Mahieu, assistant director, has been acting director since Mr. Van Duzee's death.

OVETA CULP HOBBY RESIGNS

Oveta Culp Hobby, secretary of health, education, and welfare, resigned and was replaced by former Undersecretary of the Treasury Marion B. Folsom.

FRANK A. WILDE DIES

Frank A. Wilde, 78, a Milwaukee, Wis., schoolteacher for 36 years, died of a heart attack at his home recently.

Mr. Wilde retired in 1936 after teaching industrial arts at West Division High School for 35 years. He taught one year at Riverside High School after attending the University of Wisconsin two years.

Born at Freistadt, Wis., Mr. Wilde lived most of his life in Milwaukee.

♦ W. CARLISLE ANDERSON, formerly associate professor of industrial arts at Northern Illinois State Teachers College, DeKalb, Ill., has joined the faculty of San Diego State College, Sa. Diego, Calif.

He will teach graphic arts there.

♦ ALEXANDER F. BICK, industrial-arts instructor in the Milwaukee school system, taught a course of design in woodworking at the summer session held at Stout State College, Menomonie, Wis.

♦ ROBERT BUXTON has joined the staff of the Industrial Arts Education Department of the State Teachers College of Millersville, Pa. Mr. Buxton is a graduate of Oregon State College, where he also secured his master's degree. He has done work toward the doctorate degree at the University of Maryland, and has been admitted to candidacy.

His experience includes positions at Turlock Union High School and Ventura, Calif. He has been an assistant at Oregon State College, and during the war taught at the Naval Air Technical Training Command, Chicago, and Norman, Okla.

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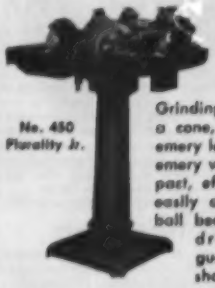

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By Francis J. Kafka. Paper cover, 84 pp., 7¾ by 10¼ in., illus., $1.25. McKnight & McKnight Publishing Co., Bloomington, Ill.

This book is designed to introduce the techniques of linoleum block printing through purposeful activity with the various production methods. It suggests projects for the individual which lead him through experiences with many different printing materials.

Included in the book is a wealth of information about the history and development of block printing, from the wide use of wood blocks in the beginning of printing reproduction, to the present-day use of linoleum in the craft of block printing. The author's suggestions for effective uses of block printing make the book especially worth while.

Industrial Arts for the General Shop

By Delmar W. Olson. Cloth, 307 pp., 6¾ by 9 ⅛ in., illus., $4. Prentice-Hall, Inc., New York 11, N. Y.

This book presents the student with an interesting picture of the industrial world. It shows what industry demands of the worker and gives a good picture of the materials and tools that are used in the various areas of industrial life.

The different chapters of the book treat of industrial drawing and design; and the wood, metal, electrical, graphic arts, and ceramic industries.

Experimental Electronics for the Beginner

By Leonard R. Crow and Lewis G. Blevins. Paper cover, 360 pp., 8½ by 11⅛ in., illus., $3.50. Universal Scientific Co. Inc., 1102 Shelby St., Vincennes, Ind.

This book is arranged in 70 profusely illustrated exercises dealing with the subject of fundamentals of electronic components and fundamental electronic circuits. Only a knowledge of elementary mathematics is required to comprehend the exercises.

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Part II of this book by the same authors will be available later this fall.

Safety in the Home Workshop

Paper, 15 pp., 6¾ by 9⅛ in., illus., 10 cents. Popular Mechanics Press, Chicago 11, Ill.

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The pamphlet is well illustrated.

How to Build Birdhouses and Feeders

By Walter E. Schutz. Cloth, 135 pp., 6⅛ by 9¼ in., illus., $2.95. The Bruce Publishing Co., 400 N. Broadway, Milwaukee 1, Wis.

An excellent little book which presents in one volume information that will please the bird lover. It will help him to attract his little feathered friends, instruct him how to build houses to shelter them, and prepare food and feeders to make their stay enjoyable for the bird lover as well as the birds.

The book also shows how to make birdbaths so that the birds can drink as well as have their baths.

Automotive Transmissions and Power Trains

By William H. Crouse. Cloth, 632 pp., 6⅛ by 9¼ in., illus., $5.75. McGraw-Hill Book Co. Inc., New York 36, N. Y.

A comprehensive, clearly written, and well-illustrated book on power-train components; clutches; transmissions; overdrives; gyromatic, hydra-matic, power glide, Fordomatic, and powerflite transmissions; and rear axles and differentials.

The book also provides the student with numerous check lists which will enable him to check what he has learned. It also contains a useful glossary of automotive terms, and excellent directions for servicing the various parts described in the book.

TV Field Service Manual With Tube Locations

By Harold Alsberg. Paper covers, spiral binding, 160 pp., 5½ by 8½ in., illus., $2.40. John F. Rider Publisher, Inc., New York 13, N. Y.

This text was written for the serviceman. It tells him how to proceed in fixing his customer's TV troubles.

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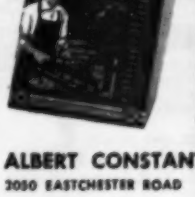

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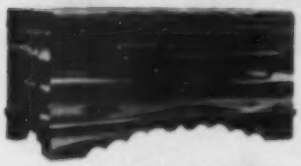

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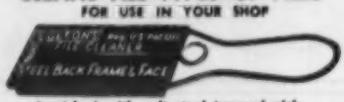

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News Notes

SCHWEIZER ANNOUNCES DESIGN CONTEST

The Educational Division of Schweizer Aircraft Corp. announces their industrial design contest for all high school shop students. Under the contest, students can participate in the creation, design, and development of useful school shop projects, utilizing technical and practical handcraft metalworking techniques. Entries must be adaptable to mass production industrial techniques, since winning entries are expected to be added to the current Schweizer series of aluminum school shop projects.

Entries must be in the form of plans or drawings showing all essential components, dimensions, construction details, and an actual working model. Materials must be aluminum wholly or in part.

Ten cash prizes are being offered with the first place winner receiving $50. Second prize is $25 and third prize is $15. In addition, teachers of prize winning students will receive a special Instructor's Manual on Aluminum Construction Techniques and a complete Schweizer aluminum school shop project.

The contest closes March 31, 1956.

♦ Stout State College, Menomonie, Wis., will hold their Second Annual Industrial Arts Workshop on October 21, 1955. This educational institution was formerly known as The Stout Institute before it was integrated under the regents of all Wisconsin State Colleges.

A number of leading industrial educators will participate in the varied program. Stout State College faculty members taking part under the general chairmanship of Dr. Herbert Anderson, include the following sectional leaders:

Dr. John A. Jarvis, industrial education; Ray Kranzusch, leather work; Philip Ruehl, electricity and electronics; and George Soderberg, general finishing.

Leading the section devoted to metal tooling will be Lovern Nauss, a prominent industrial educator from Austin, Minn.

If by October 1 any interested persons have not received notice by mail inviting them to this workshop they need only write to Dr. Herbert Anderson, % Stout State College, Menomonie, Wis. He will then send full particulars on the event.

It costs between two and three times as much to produce a barrel of oil from an offshore site as it does on land. — *Petroleum Newsnotes.*

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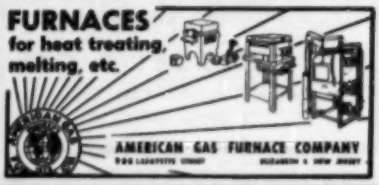

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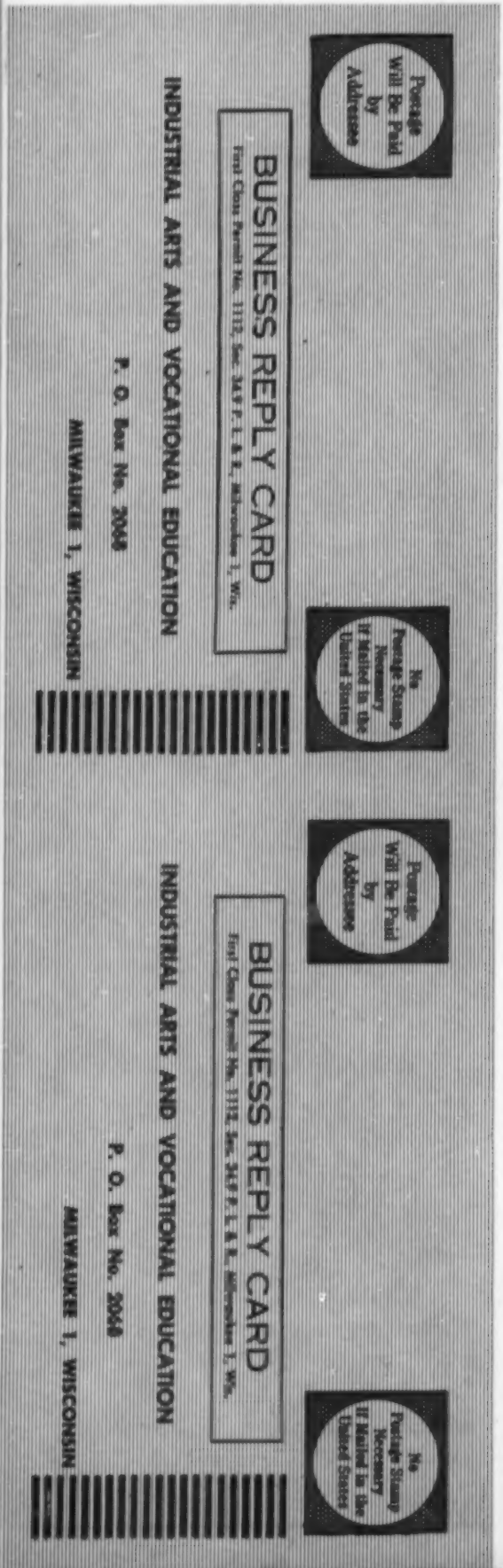
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